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THE SENATE COMMITTEE AND THE WASHINGTON GAS LIGHT COMPANY.

Those august members of the American "House of Lords," who have been carrying on a sort of kitchen-cabinet investigation into the affairs of the Washington (D. C.) Gas Light Company, have amply demonstrated their entire ignorance of a subject which, at any rate, they were supposed to approach in a frame of mind befitting the occupation or avocation of impartial students—to the end that they might hold, in case such necessity presented itself, the plane of well-balanced, impartial recommenders in shaping or proposing any remedial measures. We incline to the view that their ignorance is proven simply from the tenor of the document handed into the Senate, on date of July 7th, by Senator Spooner, of the Committee on the District of Columbia, which document is supposed to contain the essence of the gleanings of the honorable gentlemen who have labored with such zeal, misguided though it be, in the past and present vineyards of the Washington Gas Light Company, as registered on the records of that well-managed corporate enterprise. In mentioning the company's "records" it must be admitted that their continuity was not so perfect as the "investigators" might have desired, and perhaps the "break" is to be regretted, since the Senators could, in the final heat, hardly have been more severe in the "punishment" proposed to be meted out to the shareholders of the company than if they had had an opportunity of examining the "missing" ledgers.

For many years past the Washington Gas Light Company has been a prominent target for the artillery of "strikers." In fact, with each session of Congress, the other gas men of the country were wont to look upon the introduction of a measure for "the regulation of the supply of gas within the District of Columbia" as a regular feature of the proceedings of the national body of lawmakers; and the "other" gas men were not disappointed. Now, one would think where a business enterprise had been so often and so regularly investigated, that almost everything in connection with its business management would have been as an open book to the members of the upper house—for the six years' term of a Senator should mean that three examinations of the Washington Company's affairs had been made. Despite the attacks of the strikers, and notwithstanding the biennial inquiries of Congress, the company kept on performing its duty to the residents of the handsomest city of the United States in a uniformly satisfactory manner. An excellent article of gas was plentifully supplied them, and with the District Committee chiefly rested the regulation of the rate at which that gas should be sold. Quality of light and price of same not appearing as factors—that is, to the minds of at least nine-tenths of the company's consumers—against the course followed by the company, it is hard to understand why "regulation" of any sort was needed. Still, there was the other tenth—the disgruntled—whose components refused to occupy any other station in the matter than that usually reserved by the one intelligent juror. The disgruntled resolutely insisted that the gas was bad; that its price was exorbitant; that the meters were the "fastest of the fast;" and that the executive management of the company was—well; what was it that was not bad! It has long been matter of record that Washington is one of the best lighted cities in the world—as to its principal streets and avenues. Wherever the Commissioners in charge of the District allowed the Washington Company proper opportunity to display its ability to light the streets properly, it may be taken for granted the attempt was brilliantly successful. The District Committee, time and time over, made recommendation as to price, which

recommendations were acted upon and lived up to by the company. As to the meters, we need make no reference; and, once for all, the party who is forever clamoring about fast gas meters should be relegated to his proper division in humanity. In his case he may occupy either one of two sections; for should he be mentally sound, he must be classed as a knave, otherwise—a fool. The names of Messrs. Bartol, McIlhenny, and Bailey are guarantees as to the probity and fairness of the past and present executive management of the Washington Company; and no surer guarantees may be given or exacted.

With these arguments noted it might be expected that the ill-favored volleys of the "disgruntled or tenth" would fall short of the mark; but not so. The quill is supposed to be mightier than the sword, but gas men are disposed to believe that the harpings of knaves, conjoined to the sibilations of dolts, outpoint the best efforts of quill or sword. Plenty of reason exists for the belief, and the pity is that instead of decreasing with the progress of time the reverse is the case.

Having digested the status of Washington's gas supply, the "men of the upper house," after weeks of "chewing," since they could not have reasoned, judging from the appended results of their labors, ask their brother legislators to enact that the Washington Gas Light Company be required to furnish gas to its consumers at a charge not to exceed one dollar per thousand cubic feet; adding a saving clause thereto to the effect that if ordinary consumers do not settle their bills within ten days from date of presentation the Company may "charge and collect from such delinquent consumer the sum of $1.25 per thousand."

We do not understand the common law applicable to such cases in the District of Columbia; but we are inclined to believe that no gas company in the country has yet had the temerity to constitute itself a sort of police court, which, in effect, the above would seem to countenance. This seems to say that delinquent consumers may be fined—an altogether different matter from allowing a prompt paying party a reward for his fidelity in settling his bills, even admitting that both plans work out to the same end on the columns of the cash book. It is also notable, while it is proposed to cause the Government to pay $1 per thousand, that the paternal source is not liable to be mulcted on account of dilatoriness in settling the monthly gas accounts.

Section Two of the Spooner document provides that within thirty days after the act becomes a law the Secretary of War is to appoint a board of three "competent and disinterested persons," who are to be "charged" with the following duties: The first "charge" is that they shall investigate the character (*sic*) of gas usually furnished in the city of Washington by the Washington Gas Light Company, with especial reference to its healthfulness to consumers; whether it would be better for the public health that the gas furnished should be entirely coal gas or entirely water gas, or, if a mixture of the two is admissible, in what proportions the same should be combined." This opens up a chance for the "Standard" Senators to try their little game, and will give them opportunity to show that "water gas entirely" would be a good scheme—to which we might add that Washington's undertakers are likely to concur therein. The committee will then, *vide* the bill, inquire as to "the general subject of gas manufacture, and the methods and processes which produce the best gas for common use"—we hope they will finally fix these important matters; for engineers who have spent 40 years or more of their lives in the attempt to settle the moot points are not yet agreed on the subject—"regard being had to the health of consumers, illuminating power, and economy; the cost per thousand cubic feet at which such gas can be manufactured and distributed in the city of Washington, with estimates of the cost of the requisite plant for such manufacture; whether it is expedient for the Government to manufacture and furnish gas for its own use and for the use of consumers in said city;" and, to cut out the verbiage, whether or not the Government ought to buy out the present plant of the Washington Company. If the committee are so minded, ever and always provided that the bill becomes law, they will save themselves an immense amount of bother, and secure a truer result than if they hunt around on their own account, by submitting the last series of items to the careful consideration of the man who has made the Washington Gas Light Company what it is to-day—Mr. Geo. A. McIlhenny.

The bill then instructs the "disinterested three" to determine, "The actual fair cost per thousand cubic feet to the Washington Gas Light Company of the gas manufactured by it and furnished to the Government and to other consumers in the city, or of such gas as said board shall find should be furnished by said company under the law." And this seems to imply that Senator Spooner fails to understand exactly what he wants to say, but trusts to the faculties of the "three competents" to "see" it most readily.

Perhaps the gem of the measure is concealed within "general instructions," paragraph "Fourth," in which the "faithful three" are instructed to discover, "The best system of gas inspection, and the best method of protecting consumers against unfair measurement of gas furnished, and against violations of law as to the purity and healthfulness of gas; whether a reduction in the price of gas in the city of Washington has been followed by a corresponding reduction in the bills of consumers, and whether any method is or has been in use in said city whereby illuminating gas not furnished has been charged for." These innuendoes are equal to anything of the sort ever indulged in by the gas reform ninnies of New York city; and we are led to the conclusion that some near relative of the reformer Sherwood must be in the pay of Senator Spooner's committee.

Paragraph "Five" of the instructions empowers and directs the "unfortunate three" to take cognizance of any hint that may be given out by the Secretary of War, if in the opinion of that official the hint bears "upon the general subject in its relations to the interests, hygienic or otherwise, of gas consumers in the city of Washington;" and the "three" are directed to report the results of their investigations to the Secretary of War as soon as possible, but the report must not be handed in at a later day than the one which signalizes the first day's session of the next Congress. In fact, the bill really makes the Secretary of War the actual president of the Washington Gas Light Company; and the selection is, we suppose, a proper one, because the Spooner measure is nothing else than a battery trained upon the pockets of the Washington Company's shareholders. The "three" are to be entitled each to receive a compensation of "ten dollars a day for each day actually employed under the provisions" of the act; they also are to be reimbursed on account of actual expenditures incurred in the performance of their duties. A magnificent stipend, truly! Sufficiently large, of course, to secure the services of "competent and disinterested persons!" Come to think of it, perhaps Senator Spooner would feel hungry if his own dinner check did not amount to more than the sum named.

Section Third directs "that if, pending the investigation by this act directed, or if at any time the Washington Gas Light Company shall represent to the Secretary of War, under the oaths of its president and directors, that the said company cannot, by reason of increase in the cost of coal, or of labor, or of other expenses entering into the cost and distribution of gas, or because of accident, or for any cause not produced by or the fault of said Company, with due economy, earn, at the rate per thousand cubic feet for gas by this act authorized to be charged, the sum of *seven per centum per annum* net upon its capital stock of two millions of dollars, the said board shall * *" examine the case as presented, and report thereon to the Secretary of War. If the latter official sees fit, he may, with the approval of the President of the United States, license the Company to charge a sum for gas that will enable it to earn the sum of seven per cent. on its capital stock. The United States require that the wage-workers of the country shall be taxed in the sum of four per cent. per annum to pay interest on our national debt; whereas England, who borrows money for public purposes on a 25 per cent. lower interest basis, cheerfully and willingly concedes the right of capital invested in gas enterprises to receive a rate of ten, or even a greater per cent. Not only so, but she grants her gas makers protection from spoliation as long as they live up to their contracts. While we do not believe that the Spooner absurdity will ever become a law, it nevertheless may serve one useful end. That it will have done should it serve to spur on to action those who are interested in the movement to secure the establishment of gas commissions in our several States. In our next issue we will give the full text of the Spooner bill.

MICHIGAN CITY IS NOT SATISFIED.

In our item columns for April 16th we recounted, at some length, a budget of interesting facts in regard to the sudden passion conceived by the City Fathers of Michigan City, Indiana, for electric street lighting. The discussion of the question finally resulted in the purchase by the city, from the Jenney Electric Company, of Indianapolis, Ind., of a 45-light arc plant, for the sum of $8,375. We predicted at the time that Michigan City would repent of her action, but hardly supposed the verification would appear so speedily. The system has been in operation only a short time, but long enough to have disgusted the residents. The Michigan City *Dispatch*, of July 6th, said:

"There is no disguising the fact that we are being served with very poor and unreliable lighting by the electric system recently purchased from the Jenney Company, of Indianapolis." In the meantime the plant is paid for, and all that is left us is to repeat the closing lines of our April 16th item, which were:

"It would not surprise us much did we at one time or another hear that anyone desirous of purchasing a second-hand Jenney plant (in fair order) could be accommodated by applying to the municipality of Michigan City, Indiana."

With this issue we publish a diagram supplement which explains itself. We suppose the West Chester (Pa.) Gas Company's engineer is pretty well satisfied with the "indications" furnished by the pressure record shown.

[Official Report—Continued from page 8.]

Ninth Annual Meeting of the Western Gas Association.

Held at the Neil House, Columbus, Ohio, May 12 and 13, 1886.

Second Day—Morning Session—Thursday, May 13.

Discussion on the Reports of Committee on Gas Commissions.

When the reading of the reports (*ante*, pp. 5 to 8) was finished, Mr. E. McMillin said he thought it would be eminently proper that the first action to be taken in connection with the signers of the documents was to heartily thank the committee; and he (Mr. McMillin) would remark that he thought the reports just read were the most complete and commendable samples of committee work which had ever been brought before his notice. The motion for a vote of thanks to be passed to the committee was carried. Mr. E. J. King, after explaining that the committee must have been put to considerable expense in the premises, moved that the Treasurer be authorized to reimburse the committeemen for the necessary expense incurred by them in the prosecution of their investigations. Agreed to.

The President next announced that discussion on the reports was in order. He expected a most free interchange of opinion would ensue, as the subject was of vital interest to every one present.

Mr. Pratt—I, for one, do not feel as though I could decide at once, upon a question of such vast importance, after a mere hearing of the mass of evidence presented. I fear that I would not be able to act wisely in the framing of an opinion limited to or based on such hasty consideration. I, therefore, move that the committee be continued in power, and be instructed to print both the reports presented, and cause a copy of the publication to be mailed to each member of the Association, to the end that all might be able to intelligently discusss the subject at our next annual gathering. Frankly, for my own part, without further opportunity for examination, I could not vote understandingly on the question.

Mr. Lansden—If we have the time, would it not be well to express our opinions upon this subject right here and now. Perhaps I may not have much to say on the question; but, having listened attentively to the reading of the reports, which are able and complete, I think many of the members present are axious to place themselves on record in regard to the subject as presented by the majority and minority sections of the committee. I have no objection to the proposal of Mr. Pratt, and believe with him that the reports should be printed and distributed; but that plan need not be understood as debarring us from active discussion on the topic at the present hour and place. It is true that we are in reality here as gas engineers and not as gas financiers, and so perhaps this duty more properly attaches to those who manage the executive departments of our companies; but be that as it may we feel deeply interested in whatever in any way pertains to the gas business throughout the country, and such matters may fairly be considered as coming within the province of our Association discussions. I have always felt that the American Association is the one which should take up this question; and although I do not think we can attempt to dictate to our respective presidents and directors the course they shall take in the premises, still our views on the matter of the advisability of the formation of State Commissions will not fail to make some impression on them.

Mr. Pratt—I did not make the motion in order to cut off debate, but rather sought to give the members a chance to thoroughly consider the subject. It will take a longer time, perhaps, than this Association has now at its disposal to properly consider the matter, or to hear all that may be said on the subject.

Mr. John McIlhenny—This subject is of much importance to every man interested in the gas business, and I feel that anyone present who has an idea upon the subject should be permitted to express it; and, further, that he should give expression to it. It seems, from the tenor of the majority and minority reports, that both are agreed on the main question, which is that the gas interest ought to have some legal protection against undue, unreasonable and injurious competition. In your address, Mr. President, you said perhaps this was the greatest evil that confronted the gas business. We have survived cheap oil, and think we can outlive the electric light; but when a family becomes divided in its own household to the extent of seeking to destroy that which it should foster, the situation waxes serious in the extreme. We must recognize that all men who are engaged in the gas business are gas men. We cannot ignore them. In fact, as soon as our competitors secure a foothold their clamor for protection is louder than that which emanates from the original possessors of the same gas field. We have before us the experience of England, of Germany, and of France. Why shall we not profit by it? Why not adopt some of the laws in this country which have been found of advantage in other lands? It is true that foreign countries have general Parliaments or legislative bodies capable of making laws for the country at large; while here, under our system of State legislation, our appeals must be made to our individual legislatures. I do not intend to discuss the reports which have been presented, because I think, as Mr. McMillin has said, they speak for themselves, and are able and conclusive. The State of Pennsylvania has a law that inures to the benefit of the original gas company. It was passed in 1874, and limits a gas company to the payment of an eight per cent. dividend. It secures to the company an exclusive right in the district in which it operates until it has paid eight per cent. on its stock for five consecutive years. Managers of gas companies who are willing to receive annual dividends of 8 per cent. are practically free from the attacks of raiders. The New Jersey statutes on gas companies also afford some protection to the original companies; and particularly so is this true in regard to the issue of what may be honestly called bogus bonds. If we could prevail upon our State Legislatures to enact laws which would prevent the issue of bonds beyond the actual value of the gas plant intended to be put up, the opposition movement will be greatly weakened. We know that the history of gas companies in this country has been a history of speculation; and we know that works have been capitalized far beyond their value. I would suggest if the gas men of each State, regardless of organization, were to come together and frame some bill which would be just and even liberal to the public (you need not be afraid of making concessions, for almost any concessions that would be granted could not help to improve our present condition), it might result in great advantage to the gas industry. You must not seek to capitalize your property too high. If placed at ten dollars per thousand I think no objection could be raised. It will pay to be liberal in your proposition to the Legislatures in the matter of concessions you are willing to guarantee to the public. Appear before them and explain the nature of your business, and define the impossibility of the existence of true competition in that business. It is no exaggeration to say there is not a single existing competing gas company in the world to-day doing business on a legitimate basis. If you come together and agree upon some such course, and then go before the legislatures with proper bills, I venture to predict, in most instances, that you will attain your end. I have heard people say so much prejudice exists against gas companies that you will not be able to accomplish anything; but it is worth while to make the attempt. It is the prime subject of the hour in our industry, and requires our attention over everything else. Is it proper for us to meet here (and elsewhere) year after year, and merely discuss such matters? What would you think of a family of stalwart sons who discussed in their domicile how to stop a leak in the roof, while a band of plunderers stood outside and hastened on their preparations to ransack the household of the stalwarts? Would it not be better to disperse the plunderers before turning attention to the leak! That is what you need now to do. As Benjamin Franklin said (during the darkest days that witnessed the gloomiest sessions of the Continental Congress) when the Congress was engaged in discussing a most important measure, and which Franklin believed to be the only successful way of emerging from the dangers which beset them, "If we don't hang together we will all hang separately!" So, I say to you, as to this matter: "If we don't do something collectively, either by means of this body or by some other body, to resist these attacks, we will all be attacked in detail." Everyone worth attacking will be beset by these marauders. I know them well; and I know just how they are operating. They are "spotting" you out to-day in every section of this country, with the ultimate intention of wrecking your property, when they can conveniently pay attention to your investments, in the hope of making something for themselves out of that for which you have labored for years. To carry on their peculiar purposes they are abundantly equipped. They seem to have plenty of money at their command. In my opinion it is high time that the gas men set about informing the legislators, and enlightening public opinion on the subject.

Mr. Cornell—What is the real question now before us?

The President—The question is on the motion that these reports be printed and distributed to the members of the Association, to be acted upon finally in another year.

Mr. Cornell—Is discussion on the general subject proper or not, under this motion?

Mr. McMillin—If you will permit me I will offer an amendment to the motion and then we can discuss it under the amendment. The motion of the gentleman was that the committee be continued, and that they have these reports printed and sent out to the gas companies. To the motion I offer this amendment: "It is the opinion of a majority of the members of this Association that it would be wise for the Boards of Directors of our respective companies to endorse the majority report; and that, in our opinion, they should take active steps to carry out the action suggested in the majority report."

Mr. Pratt—I will accept that amendment.

The President—Mr. Pratt accepts the amendment, and now the reports are before the house for discussion.

Mr. A. C. Wood—This is a matter of vast importance to the gas interest of the country, and as such requires mature deliberation. Both of the reports are of great value. I would, however, suggest that the minority re-

port should also embrace the reasons given by those who oppose the appointment of a commission, so we may have the entire subject before us. The majority section of committee spreads before us the reasons given by those who favor such commissions, but the points made by those who are opposed to such commissions are not given.

Mr. Ramsdell—In regard thereto let me say we did not discover any record of public utterances opposed to gas commissions. The favorable sentiments quoted are matters of public notoriety, and have appeared either in the columns of the AMERICAN GAS LIGHT JOURNAL, or in the records of our Association. Objections were raised by some of those with whom we corresponded, but these were so vague and varied withal (although they in reality hinged upon about the same point) that it would be hard to incorporate them in the manner suggested. As the report says, almost the entire objection is to the manner of controlling the board. It is more a question of the adoption of a suitable law than anything else. That is what the opposition chiefly rests upon. As has been stated in this discussion both reports recommend the establishment of commissions, if they can be backed up by proper laws.

Mr. Scofield—This is indeed a matter of vital importance. I am pleased to have heard these reports, and have been an interested listener to the discussion. I have often thought over the subject, and it has been a question in my mind whether some action could be taken or laws framed which would meet our requirements. Perhaps we feel this want in the West as much or more than it is felt in the East, and it is perhaps high time that the sort of legislation necessary to meet the case had been ciphered out. I admit my inability to suggest just what kind of a law is required; but nevertheless, even admitting that time has been wasted, it is better to act wisely than hastily. I am inclined to the view that, before any decisive steps are taken by the Western Association, we should call in the advice and counsel of every other gas association of the country, to the end that concert of action and harmony of purpose may mark our course. This discussion and agitation of gas legislation is of greater importance to the gas interests of the States than all the discussions upon the various technical questions connected with gas manufacture that have previously taken place before the meetings of our Association. Under the existing state of affairs, or as to the opposition and competition with which we now have to contend, we must do our best to conquer it; or, as Mr. McIlhenny has said, "If we do not hang together, we will hang separately."

Mr. Cornell—I am unprepared to discuss this question, and yet feel as if I would like to make a remark or two with reference to it; although that which I have to say seems to me to be likely to be opposed to the general sentiment entertained here, if I may accept the spirit of the remarks of the previous speakers as an index to the logic of those who will speak subsequently. We are engaged in a common business—the manufacture of gas—and we find difficulties in our way. Doubtless it would be pleasant for us to sweep away all those difficulties at once, and so completely that we might believe we were not to be subjected to further competition. But is it not well to hesitate, or at least to thoroughly consider the course which it is now proposed to adopt as a means of getting rid of our difficulties. We are to ask help from the State. In consideration of certain protection, we are to bind ourselves to do business in a certain way, and agree to make only a stated sum of profit. Would that not be too great a constraint; and is it in accordance with the general spirit of business enterprise animating our free country? To my mind that is a spirit of non-enterprise. If our position as gas manufacturers is such as to connect us with the public needs, then I believe we may be trusted to hold our own with those who seek to compete with us; and I do not think it is necessary for us to appeal to the State for protection. If the gas business is a useful and proper one, or is one that appeals to the wants of the community, it can maintain itself; if not, then it ought not to be maintained. Such is the way the thing presents itself to my mind. My idea is that we make no undue haste in this pursuit of State Gas Commissions, and I believe we will be better served in the end by reasonable delay. Let the Massachusetts Commission work out to its legitimate result. Let us see what it is and what it amounts to before we commit ourselves, as a whole region of country, to any such enterprise.

Mr. Spencer—I am much interested in what has been said in favor of and against the gas commission scheme. I will say, first, I do not think the question will rest entirely with us, either as an association or as individual gas managers. That such commissions will come, inevitably and certainly, I cannot doubt; but the question is, shall we take the initiative and give direction to the laws to be made, or shall we antagonize them and put ourselves in an attitude to reap the results which will follow from that antagonism. I think that such is the position we occupy to-day. With reference to the remarks of Mr. Cornell, I fail to see how that speaker has justified his opposition. We cannot gain anything by delay. Our position is insecure, in that we are liable to be attacked at any moment by unscrupulous speculators; and, as it appears to me, our duty is to thwart their aims and protect ourselves. We have received valuable franchises from the people, and the speculators who wish to divide your business send agents before your common councils and assert that you have abused these privileges. In consequence of that abuse they ask to be granted a franchise—which franchise they will often offer to sell to you outright. Now, if commissions were in existence you might go before them and be fairly sure of having an honest hearing, with the result that the assertions of the agents would be disproved—provided you had lived up to your obligations—and the speculators be brought to grief. I fail to see why "protection" of that sort would not be in accordance with the commercial spirit of the country. Gas companies have the reputation of making large sums of money; well, let us have restraint in the shape of open accounts free to the inspection of the proper authorities. That will not harm us greatly, and we will not suffer much from such "constraint." I do not think that we have anything to fear from publicity. Speaking for myself I do not share in the corruption bugbear thrown out so broadly in the minority report. I think it is possible and probable that we could secure properly constituted commissions, despite our past experiences with local political bodies. I am heartily in favor of the majority report.

Mr. Howard—I am in favor of commissions. Let us take the State of Iowa as an example to determine how a commission would affect the gas industry. To begin right at my own city of Dubuque. We are selling gas there at a certain stated price, while gas companies in other cities are selling gas at $1 per thousand. Our residents want to know why such a discrepancy exists. They want to know why they also cannot have dollar gas. When you answer that it is impossible to do so, on account of cost of production, difference in quantities manufactured, etc., one would think the matter was satisfactorily and sufficiently explained; but they do not believe you. Suppose these malcontents could go before the gas commission and have the matter sifted out, how much better it would be for the consumer and for us. A commissioner could readily appreciate the varying conditions in the manufacture of gas as between one city and another, because it would be his duty to apportion the difference in circumstances existing between the varying localities. We once invited our City Council to appoint a committee to investigate our books, in order that they might see what we were doing. We told them, if upon due examination they found we ought to charge less for gas, we would do so; but they would not accept the invitation. In a town not 100 miles distant from Dubuque gas is being sold at a lower price than we can afford to sell it, and all because they secure their coal supply 75 cents per ton cheaper than we can. All facts of that nature would be presented to the notice of the commissioners, and would work to our proper benefit. A properly constituted commission would be the best thing for the gas companies of every State. I believe it to be the only way to solve the legitimacy of the gas business. A great deal of joking is indulged in with regard to gas companies—as to "what they make" and "what they do not make." In fact it is hard to make the public believe that a gas man can speak the truth. In our state of Iowa we have railroad commissioners who look after the railroads. Why can we not have a gas commission also? Is not the gas business just as legitimate as the railroad business?

Mr. Cornell—Does the railroad commission prescribe the rate of dividend which the railroad companies shall pay?

Mr. Howard—No; but the commissioners undertake to say what tariffs shall be charged.

Mr. Diall—If such is the case how is it that you pay 75 cents per ton more for coal than the neighbor of whom you spoke?

Mr. Howard—Only two railroads enter Dubuque; while our neighbor's city is blessed with three competing lines; and, again, the lines in our city have a pooling arrangement, although they do not exceed in their charges the amounts prescribed in the schedule of freight rates.

Mr. McIlhenny—One of the speakers appears to think that the passage of this proposed law would be a restriction upon our natural rights; and he further believes that every man ought to have a right to do just what he pleases in the gas business. We suffer a good many restrictions on our natural rights. For instance, we are compelled to serve on juries; and I believe it is considered generally that one province of the law is to protect people from the consequences of their own evil acts. I think I can show you, upon public grounds alone, and in the interest of the public, that this commission measure would not be of undue value to the gas men, although it would protect gas companies. All that I wish now to do is to read this review of a recent publication, in which it said, in speaking of the laws and circumstances that led to the enactment of the laws in England (where they have a good deal of enterprise) that the passing of the gas laws there did not stop public enterprise. They have the largest gas works in the world, and sell the cheapest gas in the world, one reason for which is that the industry is regulated by law. They are not subject to this competition whereby capital is so increased that it becomes impossible to earn dividends on it; and, as a consequence, on account of the restricted capital, the public reaps great benefit, while the gas investors receive greater returns than have ever been paid here. [Mr. McIlhenny then read as follows:]

"Other companies were, however, formed with statutory powers for supplying the metropolis, and in 1842 the principle of exclusive districts, which had been adopted in 1821, was finally abandoned. An act was passed authorizing a comparatively new company to supply districts already lighted by other companies, and, closely following upon this, several other acts were passed upon the same principle. This strengthened the competition which had existed for years in certain parts of the metropolis, and initiated an era of the wildest competition. The leading companies laid their mains in all the leading thoroughfares where there was a large consumption, and some of the streets were supplied from six different works through as many mains. The strife for business on the part of the companies became most unscrupulous and ruinous both to the companies and the public. The companies could pay no dividends, the discriminations were enormous and dangerous to soundly conducted business, while the repeated tearing up of streets interfered to a serious extent with the regular traffic. This sort of thing could not, of course, continue forever. As a matter of fact, it did not continue quite ten years. In 1853 the companies agreed to quit competing, divided up the territory among them, and established uniform prices for gas throughout their respective territories. The price of gas was raised considerably in order to cover the losses incident to competition, and consumers in London are still paying dividends on capital invested in the useless mains of that period. This combination and the consequent increase of price created such a great excitement that a Parliamentary investigation was ordered. As a result of this inquiry, which was unusually careful and detailed, an act was passed confirming the redistricting arrangements, securing the companies in their respective districts, and prohibiting all other companies from supplying gas within this territory without special sanction of Parliament—thus recognizing, finally and forever, that competition was out of place as a regulator of gas prices."

Mr. McMillin—Mr. Cornell has not been attending the meetings of the Association or he would probably not have advised us to go slowly. We have been exceedingly slow, for we have been at this commission subject some six or eight years; and I think it now might as well be relegated to where it properly belongs—to the boards of directors of the gas companies—as to put it off for another year. I think they can act on this matter as intelligently now as they ever will be able to do. I want to make one remark which is rather in opposition to the report; although, for the most part, I am entirely favorable to it. The report suggests, as did also the report of the Ohio Association, that one of the commissioners be selected for appointment by the gas companies. I am in favor of that plan; but the one difficulty is that in most of the States, Ohio included, the Governor appoints, and the Senate confirms; and I fail to note any legal provision whereby the gas companies might send in a name to the Senate for confirmation. As a matter of courtesy the Governor might agree to appoint a man selected by the gas companies, but certainly no statute could be passed compelling him to appoint a man named by the gas interest. I have not undertaken to say how we can get around the difficulty, although I have no doubt there are ways in which it could be done. However, as this report now stands it seems to be open to that criticism.

Mr. King—This discussion having been both interesting and profitable, I would suggest it be added to the printed report which is to be sent to each member of the Association. I, therefore, move that the discussion be appended to the reports of the committee; also that a copy of same be sent to to the President and Secretary of each Association of Gas Engineers in this country. [The motion was seconded, and the discussion was proceeded with.]

Mr. Cornell—Some good arguments have been presented in favor of the action proposed to be taken, but I hardly think the speakers appreciate the effect all this will have upon the public. If Mr. Howard and others believe the public ought to have the facts, and if the figures of their companies are likely to strenghten their position, let them make publication of the same in their local papers. Let the statements be complete in every sense. I believe, although the public may be a trifle coquettish and variable in its moods, yet, in the main, the public is as competent to judge of what is right and proper in the matter of just profits of gas companies as any gas commission can possibly be. Then, I say, publish your reports to the world, and let the people understand what you are doing. If this gas commission plan is to be in the nature of a restrictive measure accept the proposed restrictions voluntarily and without the dictation of a commission. Reduce your selling prices and your dividends voluntarily—I would rather follow that course. Be a law unto yourself, and do not invite outsiders to become your taskmasters.

Mr. Lansden—Since I have been in the gas business it has been my lot, in common with the rest of you, to be compelled to listen to all sorts of denunciations. The public never wearies of calling us frauds and thieves; and other equally ill-sounding names are freely circulated on every possible occasion when the dear people happen to recur to the gas man. The newspapers have been most pertinacious in the hounding. If we could induce the public to read the AMERICAN GAS LIGHT JOURNAL, so that it might there see and read the truth in regard to the gas industry and its operations, we might hope for the birth of a better sentiment as to our calling; but that is a vain hope. In asking for the appointment of a gas commission we only seek the privilege of "going into Court." If a man is called a thief he has the right to go before a Court to demand that his accuser either prove his charge or be punished for defaming him. We, as gas men, want to institute a method or plan under which we may say to the public, through the sworn servants of that public, that our business—as far as its every detail is concerned—is honestly conducted. A Chicago newspaper recently asserted as a result of a test on 700 meters, that 680 of the measurers were fast, adding thereto that the "gas company's officials knew the meters were fast." This is the sort of gas education which the public get from the newspapers. We now ask only the privilege of coming into Court before a set of officers who will examine our books and report to the public what we are doing. We also ask protection from the schemers who put $500,000 into a plant, which is subsequently bonded in a million and a half of bonds, and two millions or more of stock.

Mr. Thomas—The general impression among the members of our various gas associations is that existing gas companies are in need of protection for their capital. How this protection can be best afforded is the question to be settled; and, for my part, I think it can only be settled in one of two ways—either by the appointment of State Commissions, or through suitable legislation which will act as a bar against the formation of so-called competing companies. There can be no real competition in the gas business. At least I have hever yet known of the existence of such competition. The method of obtaining franchises from Aldermanic Boards is, I presume, alike in the East and the West, although I suppose it is fair to assume that the Western City Father does not hold for as "high rates" as those demanded by his Eastern prototype. However, no matter what the "price" may be, the charter is obtained, the fight is "on," but is soon terminated either by the districting process, or consolidation. Perhaps the truce is effected before the "opposition" is rightly begun. New York city's original three companies soon became seven, and in course of time six of these were merged into one combination. The metropolis still possesses two independent companies, actually in operation, while three or more charters proclaim the birth and baptism of other speculations whose sponsors are anxious to share the gas supply. One of the "independent" companies, ostensibly organized for the purpose of selling cheap gas in New York city, charged $1.75 per thousand in the metropolis, while at the same time another branch of the concern, located in Baltimore, Md., was disposing of its product at the rate of 50 cents per thousand—but a gas war was on in the neighborhood of the branch or Baltimore establishment. The same people expect to pursue similar tactics in Chicago, Ills. During the discussion this winter, at Albany, N. Y., amongst the solons, when they were considering the multiplicity of gas measures before them, a representative of one of the districts put himself on record as saying that "gas could be sold at 50 cents per thousand in New York city; and at that price the companies could make a profit of 50 per cent." If, in your respective States, you could secure just legislation which would serve as a shield, why nothing else need be attempted. Failing in that respect, then you must try the commission plan. With the proper sort of men comprising such a board, it would be easy to show them why, as Mr. Howard has said, gas necessarily costs more in one place than in another. Coal, labor, etc., vary in cost. Again, a certain named company may supply a very large amount of gas with a comparatively small outlay in the item of charges for mains, while another company may carry miles upon miles of mains for the purpose of furnishing a few street lights. Under such circumstances we have a vast difference in the cost of manufacture and distribution. If these facts were laid before an intelligent commission there would be no trouble in the adjustment of gas prices on an equitable basis. It is, of course, possible that unworthy men might be chosen to sit as commissioners, but I would be willing to take the chances if the appointing power were vested in the Governors of the States. I see no reason why action on these reports should be deferred to next year. The matter has been studied for years, and we should all know by this just what opinions we hold upon the subject. I think we should settle it at the present time. There is one thing to be remembered in regard to whatever action we may take here: The members of this Association, *vide* the language of the majority report, if they sustain the majority presentation, simply recommend it to the favorable consideration of their boards of directors. I believe this recommendation should spring from our Associations of Gas Engineers, as the engineers are those who, by their skill and application, earn the moneys which the directors subsequently pay out in the shape of dividends.

Mr. Odiorne—It is a question in my mind whether the public would, if our affairs were relegated to a Gas Commission, be any better satisfied with us than they are now. If gas companies were restricted as to what dividends they should pay, the public would at once jump to the conclusion that no economies would be observed in the conditions of manufacture. Big prices (as they would say) would be paid for supplies; and heavy salaries would go into the officers' pockets. I do not think the abuse now dealt out to us

would be lessened because of the appointment of a commission. I fear our last state would be like unto the first.

Mr. Harbison—It seems to me that a majority of the members have put themselves on record as favoring Gas Commissions, and as I have not the right or privilege of putting myself on record by a vote in opposition to the resolutions under discussion, I ask the indulgence of the Association for a few moments while giving voice to my objections to the proposed plan. I have given this subject much attention during the past two years; and am free to say that the more I think of it the more decided I am in my views thereon. I do not want to call upon anybody to decide as to how the business of the Hartford Gas Light Company shall be managed, except those who are employed to manage it. I do not desire to ask the Legislature of the State of Connecticut to appoint a commission to tell me what quality of gas shall be sent out to the people of Hartford; nor at what rate I shall sell it; nor what dividend I shall pay on an honest capital honestly invested. I believe the managers of our Company are competent to determine all these things for themselves. They have done so, without blundering, for 36 years, and I incline to the view that they may be safely trusted to continue on in the practice. I am not willing that the Hartford Company should be assessed for any portion of the expense of maintaining a Gas Commission in Connecticut, in order that possible protection may be afforded to other companies within the State which have not been properly managed, or whose managers have not conducted their past business on business principles. I do not like to be understood as reflecting at all upon the management of the business affairs of any company, but those who in times past have not followed a sound commercial policy must not expect to-day to be propped up by others who have tried to walk within safe lines. In regard to the case of Mr. Howard, who pays 75 cents per ton more for his coal than is paid by certain of his neighbors, I fail to see why he needs a commission to protect him, or else the gas consumers of Dubuque are more than ordinarily severe upon their gas suppliers. Common sense should teach them why the Dubuque Gas Company's gas must cost its manufacturers more than in the locality with which it was compared to. We have not been exempt from opposition attempts at Hartford. We have had repeated attempts of the sort before our State Legislature. In every case the applicants, having been granted a fair and impartial hearing, have had "leave to withdraw." They have no reasonable basis whereon to rest their application for a charter, and I think the same state of affairs exists in places where the old company has been doing fairly by the people. I have always held that the people have rights which gas companies are bound to respect; and now maintain that companies which have respected such rights stand in no need of "protection" of any sort. We know how difficult it is for opposition companies to effect entrance into cities whose residents have been fairly treated by their gas suppliers. If the original companies have furnished a good quality of gas at a fair price, and have paid a fair dividend on a legitimate capital, the people may be trusted to know about it. On the other hand, look at the majority of places where competing companies have been giving existence. Look over the history of the old company in such cases. Cities where opposition has flourished have been referred to here by some of the speakers; but what has been the record of the original companies in those cities? Simply this: A showing of watered stock upon which high dividends have been paid, dividends declared solely because excessive selling rates for gas were charged. Why should not competing companies seek entrance to such places? I stand up here and say that the people of such localities do right to invite competition, simply because the old companies had not treated them fairly. In any event, I do not believe in asking a Gas Commission to take a hand in directing or managing the business of a gas company. If we do not know how to manage our business we have mistaken our calling, consequently we out to get out of it and go into something else. I cannot believe that the intelligent men who compose this Association wish to have their legislators say to them: "You are not competent to take care of your own business; and so we will come in and help you with the strong arm of the law." I do not believe any such thing. In my view of it, it is an insult to ourselves. When Brother Howard says because he is a gas man the people of his town will hardly believe any statement he makes, I reply that his modesty must be the groundwork of his self-accusation; and I verily believe were I to ask the prominent people of Dubuque what they thought of Mr. Howard and his statements, they would say: "His every word is true; and we all know it." The man who conducts his business in an upright, straightforward manner, and sheds light on the community as well as on himself, cannot be misunderstood in the community. I tell you that gas men are appreciated. Let their lights go out but for a single night, and you will see how anxiously they are inquired after. Take the case of the State of Massachusetts whose commission measure has been so much discussed. Protection there was needed, for I might cite some instances where companies, until threatened with competition, kept on charging exorbitant prices for gas. With opposition staring them in the face a reduction was granted, but no credit was given for such reduction. Neither should credit have been granted, for the concession was wrung from them. They required a Gas Commission in Massachusetts simply to protect themselves from their own past injustice to consumers. In reality they should have been able to have protected themselves simply by acting fairly at the time they had everything in their own hands. Gas makers who are abreast of the times in their business, and who are availing themselves of the improvements constantly presented to their notice, do not need any legislative protection. If you have watered capital, the sooner you get rid of it the better it will be for you, because, with the water out, the sums formerly paid in dividends on it may be applied to a reduction in selling rates. A great deal of course can be said on the other side of this question; but I think if the individual members of this and other like Associations will give their attention to the careful management of their works; to experimenting in new processes of manufacture; in short, to all the practical details of their business, in connection with urging on their executive management due consideration of the fact that the people are entitled to be dealt with fairly, and that they should only be charged such rates for gas as will pay fair returns on an honest investment, I do not think that any sort of competition is to be feared. I do not fear any for the town I represent. As I said before the New England Association, last February, it is my opinion that not more than five years will have elapsed when gas will be sold at $1 per thousand in Hartford. Some six years ago I was presented by my Eastern friends with a medal (in the shape of a three-cent piece), as a reward for being the first gas man in New England to put the price of gas at $2 per thousand; and I have preserved that three-cent piece with a great deal of care, and have gazed upon it since with much pleasure. I do not believe any gas company conducting its business with due heed to the rights of those it seeked to serve will ever suffer from unjust attacks.

The President—Having heard Mr. Harbison on the resolutions, we would like to hear from our other visiting Eastern brother, Mr. Slater.

Mr. Slater—As I have already spoken several times on this question, and have always declared myself, on those occasions, as in favor of commissions, I do not know that I can now add anything which would have the merit of novelty.

Mr. Thomas—Mr. Harbison said that companies which had done a legitimate business in the past need not fear present competition. In reply let me say that the city of Newark, N. J., possesses one of the best gas plants in this country at the present day. It has been managed legitimately and progressively; and those who know Mr. Vanderpool will incline to the belief that he is disposed to deal fairly by his consumers. The people there have for years back been supplied with a gas of higher candle power than that sent out in Hartford, and the rate charged is but a trifle over that charged by Mr. Harbison's company. Despite the fact that the people had been fairly dealt with in the past by the Newark company, the Equitable managers recently sought to obtain a charter for an opposition plant, and were unsuccessful simply because they could not break a contract now existing between the city and the old companies. I am not certain, if it were left to the voice of the people, but that the schemers would have been successful. If you cannot succeed in inducing your legislators to pass protective laws, I think you had better try the commissions.

Mr. Smith—The sentiments expressed by Mr. Harbison coincide with my own views. We have been selling gas in Grand Rapids, Mich., for a number of years back, and have not asked any favors from our consumers. When we found we could make a reduction of ten or fifteen cents per thousand we did so. When gas was selling at $2 per thousand in Chicago and Cincinnati our price was $1.60. Having determined we could pay a fair dividend with selling rates at $1.50, we reduced to that figure. With improvements about to be instituted in our plant, we may soon be able to come down still lower, and our directors will not fail to sanction the plan. Of what benefit would a commission be to us? I think, as long as we treat our consumers justly and fairly, we need have no fear of raiders.

Mr. Ramsdell—I want to say a word or two in regard to this subject. Mr. Harbison is most favorably situated in the fact that he has almost absolute control of his board of directors; but the engineers of many companies, who are firm believers in the policy of cheap selling rates, are unable to cause their directors to view the matter in a similar way. I have talked with many engineers who have said to me that they knew that the receipts of their companies would justify a reduction in gas prices, and that such voluntary reduction would be gratefully received by the consumers; but the companies' directorates could not be convinced of the wisdom of the move. Now, I submit when your managers are inclined that way the engineer has a pretty hard time of it, and is apt to be looked upon by his brethren of the profession, who are not acquainted with his circumstances, as being a most unprogressive man. I grant, if we could all get our directors to reduce the price of gas when it ought to be reduced, we would avoid a great deal of this trouble. That, to my mind, is one of the strongest arguments in favor of gas commissions. If we have commissioners who will look at the matter intelligently, and who would place a just and fair valuation upon everything, they could oblige these illiberal boards of direction to move in a broader path,

Mr. McMillin—Mr. Harbison has made a most excellent speech, as he always does. Now, I would be glad to follow him in this, as in almost everything else; but at the present time I am obliged to dissent from his views. Let me give you an experience which will perhaps show you that low prices and fair treatment of those whom you serve may not be the panacea for the ills to which the gas man is heir. The Columbus (Ohio) Gas Company has been selling gas at less than $2 per thousand for many years, and in fact for several years private consumers have paid but $1.25, while the city was taxed only $1.15. Over two years ago we offered gas to the city at 90 cents, and in April of this year we offered it at 75 cents. I believe we treat our consumers well, and we certainly manage our works to the best of our ability. Our capital ratio to thousand of output is $4—if anyone present can show less water than that I would like to hear from him. Despite all this, however, simply because one member of the council has occupied his leisure hours in berating the gas company, he has convinced some of his fellows that any councilman who has a friendly word to say about us is necessarily in the pay of the Columbus gas suppliers. So well did the belligerent councilman work the matter up that he finally succeeded in forcing a resolution through the Assembly which invited the attention of capitalists to the excellent opportunity afforded by Columbus for the establishment of an opposition gas works. We do not care for that invitation, because the capitalist will look at both sides of the question before investing his money. In the first place, the Columbus Gas Company has no money for blackmailers, and it will not buy off anybody. It has a fair surplus in its treasury, and would probably apply it to offensive and defensive purposes. Like Mr. Harbison, we expect to reach the dollar limit before a great while—indeed my limit is fixed at 75 cents; and to-day we are, in fact, offering to supply light to the corporation at that figure. We will sell gas at $1.25 while that charge yields a reasonable dividend on our stock. If the time comes when our business permits of the sale of cheaper gas we will frankly acknowledge it.

The President—The question before the house is on the motion that the majority report be adopted; that it be printed, together with the minority report and discussion just held; and that copies of same be sent to each of our members, and to officers of kindred associations.

Mr. Cornell—Does the resolution imply that we recommend to the directors of our gas companies the promotion of the scheme which the majority report recommends?

The President—I understand it in that way.

The resolution was then adopted. The Association ordered a recess, the hour for reassembling being fixed at 3 P.M.

SECOND DAY—AFTERNOON SESSION—THURSDAY, MAY 13.

Order was called for at 3 P.M. The President appointed E. J. King, G. G. Ramsdell, and Thomas Smith, a committee to audit the accounts of the Treasurer.

Prof. S. H. Douglas, of Ann Arbor, Mich., now read his paper on the subject of—

CONDENSATION.

I propose to call the attention of the Association to a few suggestions on the question of condensation. I do this for the reason that I am under the impression that no small amount of error prevails among gas engineers as to the principles involved, and the proper mode of effecting the condensation of gas as it escapes from the hydraulic main.

The gas as it passes from the retorts has a temperature of about 1,800°. Relieved from combination with the coal, it has suddenly expanded, and, in expanding, its specific caloric is greatly increased, the sensible caloric becoming latent.

Reaching the stand-pipes it is, in this way, so far reduced in temperature as to cause a condensation of the less volatile hydrocarbon compounds, or tar. The stoppage of these pipes is the result.

The gas reaching the hydraulic main may be said to have a temperature of about 130°, and has a very complex composition.

The constituents number in all 42 distinct compounds, and may be divided into three groups, according to their composition and the temperature at which they are volatilized. First, the ammoniacal constituents, or five salts of ammonia; second, the tar constituents, made up of fifteen fluid and solid hydrocarbon compounds, and six organic acids—these are mostly stopped in the hydraulic main, and enter into the composition of tar; third, light yielding constituents, of which four are permanent gases; six vapors, or gases only at a somewhat high temperature; two, hydrogen and carbonic oxide, permanent gases, that hold in suspension, or by the force of adhesion, the light yielding constituents; and lastly, carbonic acid and sulphur compounds that are carried forward and separated in the scrubber and purifiers.

Keeping steadily in view the various compounds that enter the hydraulic main, the principles involved in securing the greatest amount of illuminating gas of the highest candle power are very simple indeed.

In the first place, the hydraulic main and the pipes leading therefrom must be maintained at such a temperature as will prevent the sudden condensation of the light bearing constituents and vapors, or anything more than the tar.

The effect of reduced temperature in lowering the illuminating power of gas may be illustrated by passing illuminating gas through a coil of pipe immersed in a freezing mixture. If the temperature is sufficiently low all the hydrocarbons will be condensed in the coil, and the gas that passes through will contain but little more than hydrogen and carbonic oxide. It will burn, but will give little or no light.

So, if we surround or expose our hydraulic main and condensers to a low temperature, the gas passing through will be deprived to a greater or less extent of its illuminating constituents, which constituents will be found in the tar well.

There is another important force that every gas engineer should carefully keep in mind. It is the force of adhesion, or the law of diffusion. It is the nature of all gases and vapors to intimately mix or diffuse one with another regardless of either specific gravity, or, to a limited extent, of temperature, and remain thus mixed or diffused a longer or shorter time according to circumstances.

This is illustrated in the ordinary naphtha gas machines, where atmospheric air is brought in contact with the volatile liquid naphtha, and made, by the force of adhesion, to carry forward sufficient of the vapor of naphtha to enable it to give a luminous flame.

Now, if the non-luminous constituents of gas are passed speedily from the hydraulic main through a short line of pipe, through a multitubular condenser, the gas remains in contact with the tar, holding more or less of the hydrocarbons, benzole, toluol, etc., and this force of adhesion has but a limited opportunity to act; and thus the gas is charged, to a limited extent, with the rich volatile hydrocarbons. If, on the other hand, it passes from the hydraulic main, through a long line of pipe kept at a high temperature, the best possible results will be obtained in candle power.

Fully realizing the principles here set forth, some years ago I remodeled the condensing portion of the works at Ann Arbor. In the first place I abandoned the multitubular condenser, located within 20 feet of the hydraulic main. Our works are 8-inch works.

Starting the outlet from the end of the hydraulic main at a temperature of 100°, I passed it on piers on top of the four benches until it reached a wall at the extreme end of the retort room. I then suspended it from the wall on brackets, and made the circuit of the room. Reaching the gable end, I passed a pipe several times up and down into the extreme peak of the roof, then passed it into the exhauster room, reaching the exhauster at a temperature of 85°.

It will thus be seen that the condensing pipe remained at a high temperature—suspended in the upper part of the room as it is—the gas flowing on through 203 feet of pipe, and being constantly in contact with the tar, charged as it is with the light hydrocarbons.

By the force of adhesion the gas thus becomes charged with the best illuminating material that has passed into the hydraulic main. That this result follows is shown by the fact that the gas was formerly scarcely sixteen candles in value, whereas at present it is between eighteen and twenty candles.

This principle was illustrated at our works during the last winter. A friend of mine, and a very intelligent gas engineer, had devised a plan for enriching gas with tar introduced into the retorts; and in his own works it had proved eminently successful. He desired to make a trial of it at our works, and tried it for several days. Although tested with great care, with three photometers, it did not show any material increase in the candle power of the gas.

I know of no better explanation of the failure of this experiment than the fact that, by the manner of our condensation, the illuminating constituents of the gas that are ordinarily found in the tar were passed forward in the gas. Thus there was little or nothing in the tar to furnish illuminating material.

Discussion.

Mr. McMillin—I would like to ask Prof. Douglas if he means degrees Fahrenheit when noting temperatures?

Prof. Douglas—Yes, sir.

Mr. McMillin—And you give the temperature of the gas, as it reaches the hydraulic main, at about 130°?

Prof. Douglas—Yes; by actual test.

Mr. McMillin—The gas reaches our hydraulic main ordinarily at 185° or 190°. One of the gentlemen here present some years ago devised a thermometer for taking the gas temperatures. I obtained a few of them, and he said he would not ask me to pay for them until he found out how they operated. Others who had tried them complained of their breaking too easily. The latter was the case with us. It was some time before we discovered that they were calculated to register only 145°. We find that after passing the gas made from our local coals through two multitubular condensers (20 feet

high, with some 316 pipes in each vessel, and with quite a strong stream of water flowing over them to keep the apparatus cool), then passing on through three or four hundred feet of piping, including our air condensers, we still had a temperature of from 125° to 130°. Therefore the matter of temperature would depend not only upon the quantity of gas, but also largely upon the quality of the coal carbonized. Using Youghiogheny coal, under the same conditions as those specified above on the local coal, the temperature would be about 90°. This difference may be accounted for because of the excess of moisture carried in the local coals. We can vary the candle power by changing the temperature at the retort, or by charging heavier or lighter. We never get our gas down below 100° until after it has gone through at least 300 or 400 feet of pipe.

Prof. Douglas—Allow me to suggest, in this connection, in using the multitubular condenser you condense your gas too quickly, and thus leave the illuminating constituents, to a large extent, in that vessel.

Mr. McMillin—That is a point I desired to mention. You cool your gas more before it reaches the hydraulic main than I do before I pass it through the multitubular condenser. If you have sufficient condensation without the multitubular you do not need the latter. I, however, am obliged to employ it.

Prof. Douglas—Formerly I relied entirely upon the multitubular; but for the last year I have bye-passed it. I think much depends upon causing the gas and tar to flow in the same direction. A vertical multitubular condenser does not afford a sufficiency in contact of the gas with the tar to take up the hydrocarbons as speedily as if the gas were passed through a horizontal condenser.

Mr. Jenkins—At our last meeting, I believe, Mr. President, you made a statement to the effect that in too many instances we were over condensing our gas. Working upon that suggestion, after I went home, I concluded to try the experiment. We have a scrubber, 2½ feet square by 16 feet in height. Formerly we carried a jet of water through it. I have not used a particle of water in that scrubber for over ten months. I am, of course, in a position similar to that of Prof. Douglas. I have a large condensing apparatus for the quantity of gas made, and so can thoroughly cool the gas without the aid of water. I know by actual practice that we have materially increased the candle power of our gas by the new practice.

Mr. Odiorne—I would like to ask you about the ammonia.

Mr. Jenkins—I have none to speak of. You will find in many works they pump it over and over again, in order to bring up the grade; but I do not do so. I let it go through my scrubber, and use it as far as it goes. I have no trouble with ammonia in the purifiers.

Prof. Douglas—My use of water corresponds with that of the last speaker. The gas is washed but very little. If the water touches it at all it only does so just before it reaches the purifier.

Mr. Jenkins—I had a gentleman in our works a while ago who wanted to buy our ammonia. I took him through the place and asked him what he thought about getting the ammonia out. He said he believed the ammonia that came from my scrubber would be of proper strength without any pumping over whatever.

Mr. McMillin—I think that is true. The water running off would be strong enough in ammonia; but I am afraid there would be enough ammonia left in the gas to sell that for ammonia also.

Mr. Lansden—I have 13 thermometers in our works between the hydraulic main and the gasholders. They are read twice a day, and their records are carefully kept. I would like to call the attention of the members to a wonderful change noted last year in respect to the coal that was being carbonized. I had run short of Pittsburgh coal, and purchased 1,000 tons of the Mt. Carbon (Ills.) variety. Working with Pittsburgh coal the temperature never went above 140° or 150°; but with the new sort it mounted to 175°. This state of affairs was continued during the time of carbonizing the Illinois variety. I believe that with the multitubular we can measurably control the temperature, but cannot do so with the air condensers. I would like to ask, with reference to gas leaving the purifiers at a high temperature, will it not be likely that when the gas is exposed to the cold iron of the gasholders that naphthaline will be thrown down, to the impoverishment of the illuminating value of the gas?

Prof. Douglas—I have never had any naphthaline about the works.

Mr. Lansden—Do you use Youghiogheny coal?

Prof. Douglas—Yes, sir.

Mr. Lansden—I am glad to hear of somebody who has never been troubled with naphthaline.

Prof. Douglas—Our holder is surrounded by a brick wall—it is housed in. I also carry a steam coil to the holder so as to maintain a high temperature. Probably, during the coldest days of winter, the gas would not go below 60°.

The President—In reply to the naphthaline question of Mr. Lansden, I would also say, "No."

Prof. Douglas—The point I wish to make is this. The tar and gas should remain at a moderately high temperature in contact with each other, and go on together. In other words, it should not go through the multitubular condenser suddenly, and without remaining in contact with the tar. In that connection let me say my experience leads me to believe the best condenser to employ is the old-fashioned upright tubular.

Mr. Chollar—I would like to ask Prof. Douglas in regard to his statement of the temperature of the gas as it leaves the retorts. I understood him to say that that temparature was about 1,800°?

Prof. Douglas—At 1,800°, or upwards.*

Mr. Chollar—Did you actually measure it, or did you take the temperature of the retort?

Mr. Douglas—I give King's statement as to that.

Mr. Chollar—It seems to me doubtful for the reason that the coal is decomposed entirely by heat. The distillation is destructive; and therefore the heat must become latent, as in boiling water. A large amount of heat in boiling water becomes latent, but the steam passing off at atmospheric pressure is at a comparatively low temperature, although it has absorbed a great amount of caloric.

Prof. Douglas—I took Mr. King's statement as to that. It would be a pretty nice matter to test the temperature at 1,800° with an ordinary thermometer.

Mr. Chollar—I have very serious doubts about the temperature being 1,800° at all.

Prof. Douglas—Undoubtedly the moment the gas makes its escape and becomes volatile, and passes on to the stand pipe, its capacity for caloric is very much reduced, and as the quantity of caloric becomes reduced the temperature in the stand pipe is of necessity reduced.

Mr. Chollar—It seems to me hardly possible that gas with such low degree of specific heat could possibly be reduced from 1,800° to 100° or 200° in passing over a distance of six or eight feet.

On motion of Mr. McMillin, a vote of thanks was tendered to Prof. Douglas for his paper.

[To be continued.]

A New Departure in Water Heating.

[A paper read by Thos. Fletcher, F. C. S., at the 23d Annual Meeting of the British Gas Institute. Our reprint of same is taken from the corrected report of the Institute proceedings, as published in the London *Journal of Gas Lighting*.]

It is my intention to prove to you, on theoretical grounds, and also by experimental demonstration, in such a manner as will admit of no possible doubt, that the present accepted system of water heating, by gaseous or other fuel, is a very imperfect means for an end, and is both in theory and practice essentially faulty. My statements may appear bold; but I shall be able to prove them in a manner which I think none of you will question, as the matter admits of the simplest demonstration. I will, in the first place, boil a specified quantity of water in a flat-bottomed vessel of copper; and the time required to boil this you will be able to take for yourself, as the result will be visible by the discharge of a strong jet of steam from the boiler. I will then take another copper boiler of the same form, but with only one-half the surface to give up its heat to the water, and will in this vessel boil the same quantity of water with the same burner in a little over half the time; thus about doubling the efficiency of the burner, and increasing the effective duty of the heating surface nearly four-fold, by getting almost double the work from one-half the surface.

The subject is a comparatively new one; and my experiments are far from complete on all points, but they are sufficiently so to prove my case fully. As no doubt you are all aware, it is not possible to obtain flame contact with any cold, or comparatively cold surface. This is readily proved by placing a vessel of water with a perfectly flat bottom over an atmospheric gas-burner. If the eye is placed on a level with the bottom of the vessel, a clear space will be seen between it and the flame. I cannot show this space on a lecture table to an audience; but I can prove its existence by pasting a paper label on the bottom of one of the boilers, and exposing this to the direct impact of a powerful burner during the time the water is being boiled, and you will see that it comes out perfectly clean and uncolored. Now it is well known that paper becomes charred at a temperature of about 400° Fahr.; and the fact that my test-paper is not charred proves that it has not been exposed to this temperature—the flame being in fact extinguished by the cooling power of the water in the vessel. I need hardly remind you that the speed with which convected or conducted heat is absorbed by any body is in direct ratio to the difference between its own temperature and that of the source of heat

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*OFFICE OF THE ANN ARBOR GAS LIGHT COMPANY,
ANN ARBOR, MICH., May 16, 1886.

To the Editor AMERICAN GAS LIGHT JOURNAL:—On the reading of my paper before the Western Gas Association some persons were disposed to call in question my statement as to the temperature of the gases in the interior of the retort. To substantiate my statement I can give you no better authority than is contained in the following paragraph, taking from Vol. II. p. I, of "King's Treatise on Coal Gas":

"It would appear an extraordinary fact that the gases and vapors generated in a retort, heated to say 1,800 deg. F., if allowed free egress are found to have a temperature of only 120 deg. to 130 deg."

Yours truly, S. H. DOUGLAS

in absolute contact with it; and, therefore, as the source of the heat taken up by the vessel is nothing but unburnt gases, at a temperature below 400° Fahr., the rate of absorption cannot, under any circumstances, be great; and the usual practice is to compensate for this inefficiency by an enormous extension of surface in contact with the water, which extension I will prove to you is quite unnecessary. You will see I have here a copper vessel with a number of solid copper rods depending from the lower surface; each rod passing through into the water space and being flattened into a broad head, which gives up its heat rapidly to the water.

My theory can be stated in a few words. The lower ends of the rods, not being in close communication with the water, can, and do attain a temperature sufficiently high to admit of direct flame contact; and as their efficiency, like that of the water surface, depends on the difference between their own temperature and that of the source of heat in absolute contact with them, we must, if my theory is correct, obtain a far greater duty from them. I do not wish you to take anything for granted; and although the surface of the rods, being vertical, can only be calculated for evaporating power at one-half that of a horizontal surface, as is usual in boiler practice, my margin of increased duty is so great that I can afford to ignore this, and to take the whole at what its value would be as horizontal surface, and still obtain a duty of 50 per cent. greater from a surface which is the same in area as the flat-bottomed vessel on the fireside, but having only one-third the surface area in contact with the water. I do not, of course, profess to obtain more heat from the fuel than it contains; but simply to utilize that heat to the fullest possible extent by the use of heating surfaces beyond comparison smaller than what have been considered necessary, and to prove not only that the heating surface can be concentrated in a very small area, but also that its efficiency can be greatly increased by preventing close water contact, and so permitting combustion in complete contact with a part of the heating surface. I will now boil 40 oz. of water in this flat-bottomed copper vessel; and, as you will see, sharp boiling begins in 3 min. 15 sec. from the time the gas is lighted. The small quantity of steam evolved before this time is of no importance; being caused partly by the air driven off from the water, and partly from local boiling at the edges of the vessel owing to imperfect circulation. On the bottom of the vessel is pasted a paper label, which you will see is untouched by the flame, owing to the fact that no flame can exist in contact with a cold surface.

It may be thought that, owing to the rapid conducting power of copper, the paper cannot get hot enough to char. This is quite a mistake, as I will show you by a very curious experiment. I will hold a small plate of copper in the flame for a few seconds, and will then hold it against the paper. You will see that, although the copper must of necessity be at a temperature not exceeding that of the flame, it readily chars the paper. We can, by a modification of this experiment, measure the depth of the flameless space, as the copper, if placed against the paper before it has time to be previously heated, will, if not thicker than $\frac{1}{40}$ inch, never become hot enough to discolor the paper—showing that the flame and source of heat must be below the level of a plate of metal this thickness.

In repeating this experiment I must caution you to use flour paste, not gum, which is liable to swell and force the paper past the limit of the flameless space, and also to allow the paste to dry before applying the flame, as the steam formed by the wet paste is liable also to lift the paper away and force it into the flame. I will now take a vessel which has only one-half the surface in contact with the water—the lower part being covered with copper rods, $\frac{3}{16}$ inch diameter, $\frac{1}{2}$ inch centres apart, $1\frac{1}{2}$ inches long—and you will see that, with the same burner as before, under precisely the same conditions, sharp boiling takes place in 1 min. 50 sec.; being only 13 seconds more than half the time required to produce the same result with the same quantity of water as in the previous experiment. Although the water surface in contact with the source of heat is only one-half that of the first vessel, and the burner is the same, we can see the difference not only in the time required to boil the 40 oz. of water, but also in the much greater force and volume of steam evolved when boiling does occur. With reference to the form and proportions of the conducting rods, these can only be obtained by direct experiment in each case for each distinct purpose. The conducting power of a metallic rod is limited; and the higher the temperature of the source of heat, the shorter will the rods need to be, so as to insure the free ends being below a red heat, and so prevent oxidation and wasting. There are also other reasons which limit the proportions of the rods—such as liability to choke with dirt and difficulty of cleaning, and also risk of mechanical injury in such cases as ordinary kettles or pans. All these requirements need to be met by different forms and strength of rods to insure permanent service; and, as you will see further on, by substituting in some cases a different form and type of heat conductor. To prove my theory as to the greater efficiency of the surface of the rods in contact with the flame as against that in direct contact with the water, I have another smaller vessel which, including the rods, has the same total surface in contact with the flame, but only one-third the water surface as compared with the first experiment. Using again the same quantity of water and the same burner, we get sharp boiling in 2 min. 10 sec., being an increase of duty of 50 per cent., with the same surface exposed to the flame. The rods in the last experiment form two-thirds of the total heating surface; and if we take (as I think for some careful experiments we may safely do) one-half the length of the rods to be at a temperature which will admit of direct flame contact, we have here the extraordinary result that flame contact with one-third of the heating surface increases the total fuel duty on a limited area 50 per cent. This really means that the area in contact with the flame is something like six times as efficient as the other.

In laboratory experiments it is necessary not only to get your result, but to prove that your result is correct; and the proof of the theory admits of ready demonstration in your own laboratories although it is unfit for a lecture experiment—at all events in the only form I have tested. If you will take two ordinary metal ladles for melting lead, cover the lower part of one of these with the projecting rods or studs, and leave the other plain, you will find, on melting a specified quantity of metal in each, that the difference in duty between the two is very small. The slight increase may be fully accounted for by the difference in the available heating surface reducing the amount of waste heat passing away; and this proves that flame contact, and therefore quick absorption of heat, takes place on plain surfaces as soon as these are above a certain temperature, which, in a metal ladle, very soon occurs. What the temperature is which admits of flame contact, I have, as yet, not been able to test thoroughly; and it will need some consideration how the determination of this is to be correctly made. At the same time it is a question in physics which should be capable of being answered.

Let us now take the other side of the question. If the efficiency of a surface depends on flame contact, there must, of course, be flame, or at least gases of an extremely high temperature; and we therefore cannot expect this extraordinary increase of efficiency in any part of our boiler except where flame exists, and if these projections are placed in a boiler anywhere except in contact with flame, their efficiency must be reduced to that of ordinary heating surface. They are, of course, useful; but only in the same way as ordinary flue surface. When we come to boilers for raising steam, which have to stand high pressures, we come to other difficulties of a very serious nature, which require special provision to overcome them. To put such rods as I have referred to in a boiler-plate necessitates the plate being drilled all over with holes, causing a dangerous source of weakness, as the rods cannot be used as stays. Further than this, they would render really efficient examination a matter of extreme difficulty, and would be liable to give rise to frequent and almost incurable leakages. But there is, fortunately, a very simple way to overcome this difficulty. I have found that rods or points, such as I have described, are not necessary; and that the same results can be obtained by webs or angle-ribs rolled in the plates. My experiments in this direction are not complete; but at present they tend to the conclusion that circular webs, which would be of the greatest efficiency in strengthening the flues, are not so efficient for heating as webs running lengthways with the flue, and in a line with the direction of the flame. This point is one which I am at present engaged in testing with experimental boilers of the Cornish and Lancashire type; and, as with gas, we have a fuel which renders every assistance to the experimenter, it will not take long to prove the comparative results obtained by the two different forms of web. Those of you who have steam-boilers will, no doubt, know the great liability to cracking at the rivet-holes in those parts where the plates are double; this cracking, so far as my own limited experience goes, being usually, if not always on the fire side, where the end of the plate is not in direct contact with the water—where it is, in fact, under the conditions of one of the proposed webs. I think we may safely come to the conclusion that this is caused by the great comparative expansion and contraction of the edge of the plate in contact with the fire; and it will probably be found that if the plates are covered with webs, the whole of the surface of the plates will be kept at a higher and more uniform temperature, and the tendency to cracks at the rivet-holes will be reduced. This is a question not entirely of theory, but needs to be tested in actual practice.

There is another point of importance in boilers of the locomotive class, and those in which a very high temperature is kept in the fire-box; and this is the neccessity of determining by direct experiment the speed with which heat can be safely conducted to the water without causing the evolution of steam to be so rapid as to prevent the water remaining in contact with the plates, and also whether the steam will or will not carry mechanically with it so much water as to make it objectionably wet, and cause priming and loss of work by water being carried into the cylinders. I have observed in the open boilers I use that, when sufficient heat is applied to evaporate 1 cubic foot of water per hour from 1 square foot of boiler surface, the bulk of the water in the vessel is about doubled, and the water holds permanently in suspension a bulk of steam equal to itself. I have, as yet, not had sufficient experience to say anything positively as to the formation or adhesion of scale on such surfaces as I refer to; but the whole of my experimental boilers have, up to the present, remained bright and clean on the water surface, being distinctly

cleaner than the boiler used with ordinary flat surfaces. It is, I believe, generally acknowledged that quick heating and rapid circulation prevents, to some extent, the formation of hard scale; and this is in perfect accord with the results of my experiments. The experiments which I have shown you demonstrate, I think, beyond all question that the steaming power of boilers in limited spaces—such as in our sea-going ships—can be greatly increased; and when we consider how valuable space is on board ship, the matter is one worthy of serious study and experiment. It may be well to mention that some applications of this theory are already patented.

I will now show you as a matter of interest in the application of coal gas as a fuel how quickly a small quantity of water can be boiled by a kettle constructed on the principle I have described; and to make the experiment a practical one, I will use a heavy and strongly-made copper kettle which weighs 6½ lbs., and will hold when full one gallon. In this kettle I will boil a pint of water; and, as you see, rapid boiling takes place in 50 seconds. The same result could be attained in a light and specially-made kettle in 30 seconds; but the experiment would not be a really practical one, as the vessel used would not be fit for hard daily service. I have therefore limited myself to what can be done in actual daily work rather than laboratory results, which, however interesting they may be, would not be a fair example of the apparatus at present in actual use.

At the conclusion of his paper Mr. Fletcher added the following information. He said the effective duty of gas in small vessels was, on an average, about 300 to 320 units per cubic foot; the total being 660 units. This average was not exceeded, even if it were, in practice, reached in ordinary boiling in small vessels. In larger vessels, where excessive duties with the very high speeds were not required, it was possible to obtain in ordinary flat-bottomed vessels, with projecting rivets, as much as 520 units. Where larger surfaces could be employed, the duty could be brought to the theoretical total; but with small boiling surfaces, such as were in use in domestic pans and kettles, the average duty would certainly not be more than 150 units. His object had been to demonstrate that the waste heat, whatever it was, could be reduced to one-half by simply adding studs to the bottom.

Discussion.

Mr. D. Bruce Peebles (Edingburgh) said that, when making some experiments in this way a few years ago, he found that great advantage was gained by introducing a small plate between the vessel to be heated and the burner. He fancied a good deal of the disadvantage of using flame contact was that the flame was cooled—in other words, the flame did not get to the bottom of the vessel; but by the interposition of a very small plate between the cooled bottom of the kettle and the flame, the latter immediately heated this small plate, and its temperature was not reduced in the same way as it would otherwise be. He took the thinnest sheet iron he could get, perforated it with holes, and placed it between the burner and the bottom of the kettle.

Mr. W. Foulis (Glasgow) said he also had been making some experiments on the subject of water heating; but all his experience had been in an entirely opposite direction to Mr. Fletcher's. This gentlemen seemed to have some idea that flame contact had some physical advantage over the mere heating effect of hot gases, apart from flame; but it appeared to him that this idea was somewhat contrary to the opinions of Mr. F. Siemens and others who had worked in this section. A body, even red hot, was cold to flame, and must check combustion; and a number of spikes so cold as these must be (one end being in contact with the water) must have an injurious effect on the combustion. The theory which he thought the more correct, and which would certainly give better results, was that combustion should be completed before the flame came in contact with any surface whatever, even although this surface were red hot. There was no doubt at all that in the experiments now made (apart altogether from the quantity of gas consumed), there must be a much greater heating effect by adding the spikes, because these entered into the flame, and absorbed a great deal of heat which would otherwise pass along below the kettle and go off to the atmosphere. He did not know how Mr. Fletcher calculated the heating surface; but there must be a very great increase in it. The experiments he had made proved conclusively to his mind that it was not a wise thing, if economy in gas were any consideration, to bring flame into contact with any surface until the combustion was perfectly complete.

Mr. H. Ashton Hill (Wallasey) asked Mr. Fletcher if he knew anything about Fox's corrugated furnace, and if he could say what was its relative efficiency as compared with his own appliance.

Mr. C. R. Mead (Sutton, Surrey) remarked that there was no doubt Mr. Fletcher had, by the application of heat-conducting pins, succeeded in boiling water in less time, and with a smaller consumption of fuel, than would be possible without some such appliance. The device of pins in boilers was not at all a new thing. It was done by Mr. Williams, of Liverpool, some years ago; and probably many gentlemen present had read his treatise on boiler furnaces. He tried a great many experiments; and, amongst other things, he carried the pins through the boiler plates, and made them project inside as well as outside, and obtained a better result by so doing. Perhaps in the application of pins to kettles of this kind, it would not be prudent to carry them through; because, in the event of being charged with chalk, there would be a condition of things in the kettle which, in the first place, would destroy the value of the heating surface, and prevent the kettle being cleaned. There was no doubt that Mr. Fletcher had effected a great saving, though it was not done in the most highly scientific way. Still there was a practical result; and if they each could do something practically useful, they must be content, without aspiring to theoretical perfection.

Mr. W. Sugg (London) thought the whole meeting had been very much interested in the experiments shown by Mr. Fletcher. As had been said, it was known to many that the method of introducing pins at the bottom of a boiler was not new; and he did not think Mr. Fletcher had said it was. But the great value which attached to these experiments was the fact that the time must be near when steam-boilers, especially small ones, would be heated by gas. He saw the President shake his head at that; but he believed it would be the case. The great difficulty to be dealt with was the expense; but with the price of gas going in the direction it was now, he thought they were not far from this point. At all events, Mr. Fletcher had shown how one could utilize a fuel brought to the boiler in a state ready for burning, without having to manufacture the gas under the boiler before burning it. There was less work to be done before it was converted into heat and did its work in heating water. No doubt the same thing applied to steam-boilers would facilitate the use of gas, and enable it to be employed without the loss which now occurred from passing the heat through tubes. Those who had tried experiments with water knew that the great difficulty was to utilize the whole of the heat in the gas; for, try what one might, a great deal escaped. The system of Field tubes, which was constantly in use in fire-engine boilers, fired with coal or wood, would, in his opinion, have a much greater effect if gas were employed, and would be nearly as cheap as using coal. At the present price of coke this might be a serious obstacle, because this fuel was used so extensively for firing boilers; but he thought there were many small-power boilers, where a gas-engine could not be used, to which gas might be applied on some such system as Mr. Fletcher had brought forward.

Mr. J. P. Leather (Burnley) said the point which occurred to him in connection with the paper was not that the system described was applicable to steam-boilers, because he understood Mr. Fletcher to hint that it was not so applicable to this purpose, but it seemed more promising for household use. In the case of the domestic kettle, they did not want a lot of flues carrying the heat round, because it would cause complexity, and require a large amount of space; and Mr. Fletcher's idea seemed to be to get the heat through as small a surface as possible. They did not wish to use a large extent of space to heat a small quantity of water. In this the metal was at a high temperature; for though, as Mr. Foulis had said, the studs must lower the temperature of the flame, they did not diminish it so much as a flat-bottomed vessel would do. Consequently there was a larger amount of conduction for the same extent of surface. This seemed to be a great advantage, if it was not too costly.

Mr. George Anderson (London) asked whether Mr. Fletcher did not consider it advisable to include the sides of the vessel as well as the bottom in taking up heat from flame. Many years ago, when boiling by gas used to be done over a common trivet, he made experiments in this direction by putting a cylinder round the kettle, half an inch or thereabouts away from it, and resting the kettle at the rim instead of at the bottom. By thus enclosing the sides he reduced by 40 per cent. the time and amount of gas required for boiling. They all knew that Mr. Fletcher was a very practical man, and he put this forward as a practical apparatus; but it appeared to him (Mr. Anderson) that such a kettle as had been shown would be very apt to become damaged by a careless servant. The rivets would soon be destroyed; and he thought it was well to have a rim extending downwards. so as to secure them from being struck.

Mr. Fletcher, in reply, said the previous use of rivets in boilers was hardly his point. His object was to define the laws and the theory of this question, and to obtain some knowledge of what actually took place in contact with water surfaces. What was new or what was not new, so far as the form was concerned, mattered very little to him. His point was rather the theory of the thing. The first principles of combustion under such conditions had never yet been studied; and the action of flame in contact with cold surfaces was unknown. With regard to utilizing the sides of the kettle, there was one practical difficulty—viz., that if the sides were covered with pins, unless the vessel was always full of water, the pins were liable to be damaged, because they would certainly get red hot in a few seconds if they were not in contact with water at the inside edge. For this reason he placed them at the bottom only in ordinary kettles. In reply to Mr. Foulis, as to the absence of flame contact, he thought contact might exist with a heated surface; and the amount of surface being equal, the duty obtained was greater. Where there was an absence of flame contact, the surfaces required to be larger. Mr. Foulis had opened a very wide field of inquiry; and he thought

he should have to convert him privately, by experiment. With regard to the liability to damage, he might say that the kettle shown was not intended for an average domestic servant; it was designed entirely for restaurant purposes, where excessive rapidity of boiling was absolutely essential. This speed would, in ordinary houses, be rather objectionable, because the kettle would require to be watched, as the rate of boiling was so great that, if it were more than half full, the water would come out bodily from the spout as soon as full boiling occurred. It was entirely a pattern for restaurant purposes, and for use by careful people, where excessive speed was requisite.

The President said he was sure the members had all been much gratified by hearing the paper and witnessing the experiments performed by Mr. Fletcher. There was no one to whom they were so much indebted for many practical applications of gas, especially for domestic purposes. In the reign of Queen Elizabeth there was a very wise man named Lord Burleigh, whose wisdom was not embodied in words, but was measured by the gravity with which he shook his head. He (the President) was glad to say that Mr. Sugg had compared him in one respect to that eminent statesman; but he might tell him the reason why he thought there were something of the proverbial wisdom of Lord Burleigh's nod in that movement. In the gas-engine it was found that about 22, and in some cases 25 per cent. of the total thermal power of the gas had been converted into motive force; and the reason he did not think gas under boilers would succeed in competition with gas-engines proper was that in small steam-engines very rarely 5 per cent. of the thermal efficiency of the heat was converted into power. Besides that, out of 630 or (as Mr. Fletcher said) 660 units of heat, 520 was about the highest efficiency which had been obtained; so that something more than one-fifth or nearly one-fourth of the total efficiency of the gas must always be lost. If, therefore, they had on one side a boiler in which one-fourth of the efficiency was lost, and then the steam produced from it gave only 5 per cent. of what was left, he did not see how this could ever possibly compete with a gas-engine which would give a return of from 20 to 25 per cent. of the whole heat employed. Gas-heated boilers were already in use; but producer gas was used—not illuminating gas, which was too dear for the purpose. He had himself some years since tried experiments on vessels supplied with copper wires passing through the bottom, but was not encouraged to persevere. Probably the lengths and diameters of the wires were not properly proportioned. It was, however, clearly proved that Mr. Fletcher had successfully solved the problem, and so given another boon in addition to the many he had conferred before upon both the consumers and producers of gas. He (the president) had to thank him also for the appropriate and convincing experiments by which he proved his theses.

The Electric Light on the Suez Canal.

According to *Engineering* the passage of the Suez Canal, which until recently occupied from thirty-six to forty-eight hours, can be made, now that navigation during the night is possible, in sixteen hours for mail steamers and war vessels, fitted with the electric light apparatus and projectors prescribed by the Canal Company. This important advance is the result of a very interesting report by Commander Hector, of the steamer Carthage, belonging to the Peninsular and Oriental Company, and addressed to the directors. This report written after the Carthage made the first continuous passage, under the authorization of the Canal Company, given the 1st of December, 1885. The Carthage arrived at Suez after a run from Port Said of 18 hours. The actual running time was sixteen hours, there having been two delays caused by impediments in the channel; the mean speed made was 5.43 miles per hour. The passage as far as Ismailia was the most interesting, because it was the first attempt to take a large vessel through at night, with the aid of the electric light. On the arrival of the Carthage at Port Said it prepared for its immediate entry into the canal and its free passage to Ismailia. The start was arranged for 8 P.M., and a number of persons interested in the experiment went on board. The projector was placed forward, and at a height of 16 feet above the water. Shortly before 8 the dynamo was started and the circuit closed. As soon as the projector was illuminated it was evident that its position had been well selected, and that the power of the beam, as well as the amplitude of the luminous zone, were ample to insure the success of the experiment. The number of surrounding lights, and the presence of a steamer taking in coal by the light of torches, prevented those on board the Carthage from seeing the buoys placed at the entry of the canal. At 8 o'clock the mooring ropes were cast off, and as soon as the steamer had passed the buoys the entry of the canal could be seen. The entrance to the canal is on a curve which may easily cause a difficulty if the buoys are lost sight of. To prevent this the first two had been previously lighted. It was evident, however, that this precaution was unnecessary, because the power of the projected beam was ample to enable the lookout to see the buoys. The moon did not rise till 9 o'clock, so that during the first hour the run was made in darkness. As soon as the straight portion of the canal was reached the value of the projector was evident, the amplitude of the beam being sufficient to illuminate the buoys on each side of the channel. Further on the banks of the canal, as well as the channel markings, were clearly visible; the effective range was then three-tenths of a mile, more than sufficient for the handling of the ship. The light color of the banks, reflecting the beam from the ship, further assisted the illumination, and the influence of this reflection was especially noticeable along the high banks of the curves near Ismailia. This station was reached at 5:15 A. M., without any difficulty having been experienced during the journey, but with a delay two miles south of Ismailia. A dredger on the Western side had neglected to show her lights, and the pilot was obliged to stop, and on again starting, although the dredger had been passed successfully, the ship had not recovered sufficient speed to take the curve of the canal. It was therefore necessary to stop again and go astern. In this way an hour was lost, but the average speed made, allowing for this delay was 5.09 miles per hour from Port Said. The practicability of passing through the canal by the aid of the electric light was thus demonstrated by this first experiment.

The directing lights placed on the banks opposite each station served to direct the ship during the moments of extinction of the projector. It should be added that the conditions were very favorable for the success of the experiment; a clear air, brilliant moonlight after 9 P.M., and no wind. However, the captain in his report does not consider that the moonlight assisted in the success of the experiment, as during the first hour, when the night was quite dark, no difficulty was encountered, and the buoys marking the channel could be very clearly distinguished. It is quite unnecessary to enlarge on the advantages arising from the economy of from 18 to 26 hours without any serious increase in expense, but it will be of some interest to point out how the result was brought about.

After considerable investigation the Suez Canal Company established six fixed signal lights, supplied with petroleum, between Port Said and kilometer 54; these lights give the pilots their alignment in the straight sections. The company also prescribed, in certain regulations for the night transit, the conditions which the electric light apparatus must fulfil. Article 2 runs thus: "The commander of vessels of war and mail steamers that are intended to be taken during the night from Port Said to kilometer 54, and *vice versa*, must notify to the agents of the company at Port Said, Ismailia, or Port Tewfik, that they are provided with the following apparatus. 1. Forward, an electric projector, with a range of 1200 meters. 2. Aft, an electric light capable of illuminating a circular field of from 200 to 300 meters in diameter. 3. On each side an electric lamp and reflector.

These conditions were laid down after a series of experiments made in the canal by the company, aided by M. Lemonnier, of the well-known firm of Sautter-Lemonnier & Co., Paris. These experiments demonstrated that the forward projector must have a high power, and give a beam suitable to the dimensions of the canal and the positions of the buoys; that it should be placed from 3 to 4 meters above the level of the water, beyond the view of the pilot; that the side and the stern lamps should fulfil certain conditions, that they should be easily managed, and that their control should be under the hand of the pilot, that he may light or extinguish any or all of them at will.

The foregoing conditions can be easily complied with on all ships fitted with electric light apparatus, and those vessels not so provided can, if they wish, follow the example of the Peninsular and Oriental Company, who have solved the problem for their fleet in the following manner. A complete plant, including dynamos and steam motor, switchboard, projectors, lamps, conductors, etc., is taken on board on entering the canal, and discharged on leaving it. Suitable arrangements for making steam connection are, of course, provided on board. The work of taking this installation on board and discharging it is done very rapidly, so that no delay at either end of the canal is caused. After several trials with different apparatus, the Peninsular and Oriental Company have ordered some sets of apparatus from M. M. Sautter, Lemonnier & Company, similar to that employed on the Carthage. The apparatus includes a compound Gramme dynamo, driven direct by a Brotherhood engine, both of them being on one bedplate, a Mangin projector with a planetic mirror, hand lamps, conductors, and switchboards, the whole being arranged very compactly for easy handling.

Coal Tar and Other Industries.

At a recent meeting of the Manchester (England) Section of the Society of Chemical Industry Mr. Ivan Levinstein delivered a most interesting lecture based upon "observations and suggestions on the British chemical industries, with special reference to coal tar derivatives." A large audience listened with close attention to the speaker's remarks. After noting that Prof. Bayer (the discoverer of artificial indigo), when addressing a German audience, in 1878, said, "We (the Germans) must not rest on our laurels, for we may be sure that England, who at present looks on quietly while we purchase her tar and convert it into colors—selling them to foreign nations at high prices—will unhesitatingly cut off the source of supply as soon as all the technical difficulties have been surmounted by German manufacturers," Mr. Levinstein went on to say that eight years had passed since this prediction was indulged in by Prof. Bayer, and yet England had not cut off from Germany the source of supply. Proceeding with his subject the lecturer said:

We still supplied Germany with three-fourths of the hydrocarbons which she required, and we still allowed Germany to supply us with at least three-fourths of the coloring matters which we use. It might be argued that, after all, trade was in principle only an exchange of commodities, and as long as we supply Germany with the raw material and it pays us to purchase from her the colors manufactured from it, there is no ground for complaint. This sounded plausible, and the assertion might be true if we got twenty shillings in exchange for a sovereign, or if the profits realized on our raw material

were equal to those obtainable by turning the latter into finished products. But our tar distillers were by no means so favorably situated as the German manufacturers. Instead of getting twenty shillings in exchange we did not even receive five shillings in return for our sovereign. And yet the natural advantages were all on our side. Some little time ago an attempt was made to fulfil, in some measure, the prognostications of Prof. Bayer, not exactly by cutting off the source of supply, but by endeavoring artificially to inflate, or at least control, the prices of the products of coal tar distillation; but experience taught, in this case as in all previous instances, that such attempts, however successful they might appear for a short time, ended as a rule sooner or later in heavy losses to the promoters and disaster to the participators. Trade did not admit of coercion; it must expand on natural bases. And there was only one sound way of stopping the supply of our raw materials to competitors (which, after all, was in a certain sense but limited in its operation), and that was by using them ourselves, and thus turning them to profitable account. Only thus could we secure to ourselves their full value and benefit not only of the industry more directly concerned, but also other collateral industries.

The productive capacity of the United Kingdom in benzene-toluene might be put down, without reckoning gas benzene, at nearly 3,000,000 gallons; of which quantity Germany took about one-half—viz., 1,500,000 gallons—and England half a million, the remainder going to France, Switzerland, and other countries, or constituting, as at present, surplus stock. The home production of Germany and France did not exceed one million gallons, about equally divided between the two. Of the half million gallons required by this country, only about half was converted into coloring matters, the other quarter of a million was exported as aniline-toluidine, pure aniline, or aniline salt. The entire consumption of benzene-toluene in Germany would be about 2,000,000 gallons per annum, of which half a million was of home production. Of these two millions, about 1,600,000 gallons were converted into coloring matters, the remainder was turned into other tar derivatives, so that Germany required four times the amount of benzene that we did, and she therefore had to depend upon us for three-fourths of her supply. But when we considered the quantities of benzene-toluene actually converted into coloring matter, we found that Germany produced more than six times the amount of colors that this country did. Besides the benzene-toluene, Germany also imported from four to five thousand tons of anthracene, some naphthaline, xylene, etc., and in order to convert these hydrocarbons into colors and other tar derivatives there were required annually upward of 70,000 tons of concentrated sulphuric acid, 25,000 to 30,000 tons of carbonate of soda, which was nearly one-third of the total quantity of soda produced in Germany in 1883, and 40,000 tons of hydrochloric acid; besides large quantities of acetic acid, ammonia, nitrate of soda, salt, etc.

These figures give some approximate idea of how other industries had been benefited by the expansion of the tar industry. We need not be surprised at the rapid increase of the production of sulphuric acid in Germany which had more than trebled within ten years, for while in 1875 only 102,546 tons of sulphuric acid were produced, this quantity increased in 1884 to 345,138 tons. An increase of a similar nature had taken place in the production of soda in Germany, owing largely to the development of the coal tar industry.

Proceeding to inquire into the natural advantages possessed by this country for carrying on the manufacture of coal tar derivatives, Mr. Levinstein stated that the primary raw materials required in the manufacture of coal tar colors—viz.: (1) The products of gas tar distillation—benzene, toulene, carbolic acid, xylene, naphthalene, anthracene—(2) ammonia, (3) coal, (4) salt, (5) lime, (6) pyrites, (7) nitrate of sode, (8) iron, were all natural products, and were obtainable at a considerably lower cost in England than in Germany. Those numbered 1, 2, 3, 4, and 8 were important articles of export from this country, while Nos. 6 and 7 could be got here, on account of cheaper freight, at less cost than in Germany. To these advantages must be added our more favorable geographical position, our far larger home consumption of coloring matters, and also greater cheapness of building materials. He would at once be told that the Germans had a complete set-off against all these advantages in the shape of cheaper labor, and that their chemists are more skilful than ours. As regards the question of the comparative cost of labor, he admitted that there was a difference between the wages paid to the men employed in chemical works in the two countries, but this difference did not at the present moment exceed 2s. per head weekly. This difference in wages could be made up and matters equalized by a larger outlay of capital in the construction of general plant and of comparatively larger buildings, both of which were cheaper here than there, and, therefore, did not ultimately increase the general expenses of the manufacturer. But apart from this it did not require much foresight to predict that ere long—with the fiscal policy of the German Government, which was steadily causing an increase in the cost of living, and must necessarily bring about a corresponding rise in wages, while the opposite was taking place in this country—the question of the actual cost of labor might change, if anything, to our advantage. And as regards the assertion respecting the superior chemical skill of the Germans, this principally applies to the bringing out of new products, and not as much to the manufacture of articles the chemistry of which was well known. A number of foreign patents had run out by lapse of time, or from other causes, and the chemical constitution of by far the largest number of coloring matters in use was well understood, and the technical difficulties connected with producing them in the most economical manner had been overcome, so that we might safely say that at least 75 per cent. of the benzene-toluene and 90 per cent. of the anthracene exported might be converted into colors without the least aid from any chemist of special genius. In alluding to the manufacture of these colored tar derivatives, in connection with which superior knowledge on the part of the Germans could no longer be argued, it was very far from his intention to harbor the thought that we should be merely imitators of them. He only referred to the fact that any knowledge possessed by them was at once open to and available by us for turning the greater portion of our raw material to more profitable account. Our prospects as regards striking out in new and original lines had also improved. Some of our leading scientific men were beginning to recognize the fact that we had allowed our neighbors to snatch from us an industry the importance of which was daily increasing, and in the development of which every intelligent Englishman, who had the increase of the national prosperity at heart, ought to take the highest interest. New colleges with first-class laboratories were steadily being opened, a larger number of papers bearing on this and collateral industries were being read before our learned societies, and our efforts were beginning to show a result which, however insignificant as yet as compared with those obtained by the Germans, was still encouraging.

The production of coloring matters in this country, excluding alizarin, had increased. Still the increase, which might be due to the manufacture of some specialties, was not only not nearly what it might and should be, but disappeared to some extent when we took into account the greatly increased production of coal tar derivatives. He contended that there were no real difficulties in the way of our getting hold of the larger share of this business, if only the true position of this industry, its constantly growing extension, its daily increasing importance, and its important bearing on the development of other industries were fully understood and appreciated by the nation, and especially by its enterprising capitalists. The development of industrial enterprise in this country had for the last thirty years been practically confined to cotton, wool, iron, and coal, to the lamentable neglect of other industries of apparently minor importance, while the chemical industries had been left in the hands of a few, who—often more by good luck than through scientific attainments or intelligent management, but aided by the natural wealth of the country—had carried on the business more or less successfully, whilst, outside of these few, the general public was in profound ignorance of industrial chemistry. This was one of the great obstacles to progress. What was also required was more widespread knowedge of chemical engineering, by which he meant the conversion of laboratory processes into industrial ones. It was, in his opinion, very desirable to attach to our chemical laboratories, in a tentative way, an engineering laboratory, where all sorts of appliances could be devised and constructed, and the conversion of laboratory processes into practical industrial ones could be effected.

After giving some further details with regard to the causes which had led to the present position of the coal tar industry, the special advantages which we possessed for its development, and the injury which its neglect had inflicted on other industries, he endeavored to show the quickest and most effective manner in which some of the obstacles in the way of the rapid progress of the industry might be overcome. The question of improved chemical engineering was, he said, of comparatively little importance—at any rate for the present—as the extra cost of procuring special plant from Germany, disheartening as such a course might be, was fully balanced by the greater cheapness of general plant in this country. The difficulty in the case of the ammonia soda was much greater; here the only likely chances were either that our enterprising capitalists, or our present Leblanc soda makers, would bestir themselves, or if they could not be moved, we must trust to the Germans. The fact that they had started to compete in ammonia soda might induce practically the only British maker of this article to reduce his present price. But there was still another feature in the case which might favor a reduction in the price of this article. The quantity manufactured in Germany already exceeded the demand, and it might pay the makers there to export it at a still lower price, or even at actual cost, in order to pay expenses; the profit being of course made on the sales in their own country, where they now had the full swing of the market. The fast developing ammonia soda manufacture in Belgium must also be taken into account; so that there was at any rate a great probability that the present high price could not long be maintained. As to sulphuric acid, if it really was a fact that our makers could not sell this article with a margin of profit at the same price as their German competitors, they must either remodel their works or alter their process; and if they could not be induced to do this, then let a few

larger consumers of sulphuric acid combine and put up their own vitriol chambers in a convenient locality, adopting all the improvements, whatever they might be, of our rivals. If all these obstacles could be removed—and there was no tangible reason why they should not—and if the importance of the chemical industries came to be fully appreciated by the nation at large, and not by a few individuals, then he would say again, as he said in 1883, "Even if the foreign manufacturers were, for some special reason, to sell without profit, yet we ought, through the greater cheapness of our raw materials, to manage to realize at least 10 per cent. profit."

Before resuming his seat Mr. Levinstein, reverting to the paper which he read before the Society in February last, on the subject of "Saccharin," said a company had now been formed in Germany for the purpose of erecting works for the manufacture of saccharin. Suitable land had already been chosen near Magdeburg, and it was expected that saccharin would be offered to the trade in the beginning of the year. He trusted the day was not far distant when it would be our turn to present to the world some new processes for obtaining artificial indigo or other coloring matters, and also new febrifuges or other derivatives possessing valuable medicinal properties, and new methods of turning some of our surplus tar into sugar or its equivalents.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

The Deepest Artesian Well.—A correspondent encloses a newspaper "cutting" which states that the deepest artesian well in the world is that now being bored at Pesth, for the purpose of supplying the public baths and other establishments with hot water. A depth of 951 meters (3,120 feet) has already been reached, and the flow secured aggregates 850 cubic meters (176,000 gallons) each 24 hours, the temperature of the water being 70° Centigrade (158° Fah.) The municipality which is conducting the work as a public measure is not satisfied with the above showing, and has lately voted a large appropriation in order that the boring may be continued to a greater depth, not only to obtain a larger volume of water, but also to secure a gain in temperature of same. It is thought the flow from the lower levels will show a temperature of 80° Centigrade (176° Fah.)

Gallipolis (Ohio) Cannot Pay for the Lighting of its Streets.—Some time since a few of the "very best people" of Gallipolis resolved to form themselves into a "citizens committee" with the purpose of reforming things generally in that handsome borough. As one would suppose, the Common Council and its doings were investigated, with the result that the committee unearthed a "terrible scandal." For years back it has been the Gallipolis custom to make contracts to some extent in anticipation of the payment of incoming taxes, and we believe that no harm has resulted therefrom. Of course, the aforementioned plan is not the best in the world to pursue, and in fact a too free indulgence in it might lead to the occupation of an unenviable financial status; but a growing city often requires many an unforeseen expenditure in order that those who are attracted to its limits may be induced to become permanent occupiers thereof. It would, therefore, seem to many that good public policy might be subserved if the "pay as you go" theory were slightly departed from in case of the cropping out of one of the "emergencies." We may assume that lighted streets are an absolute necessity to the comfort and welfare of the people of any fair-sized locality, and particularly so in the case of a locality anxious to figure on the maps as larger than a post village. A well-kept lamp-post is certainly equal to the services rendered by an average guardian of the peace in the guise of an ordinary policeman, to say nothing of its usefulness as an illuminator; and therefore do we think that the Gallipolis' citizens committee stand decidedly in the light of the future prospects of their chosen abode through the advice recently given by them to their Board of Councilmen. They (the committee), at the council meeting held June 30th, called the attention of the municipal rulers to the fact that the revised statutes of Ohio, passed in 1883, prohibit the making of public contracts unless the moneys to pay for the same are previously placed in the public treasury. It was urged that that law was being violated in Gallipolis, and the committee hoped a halt would be called. Mr. Brandyberry, no doubt recurring with fright to the threatening possibilities of being hauled over the coals for malfeasance in office, offered a series of resolutions which, in effect, ordered that the committee on gas be instructed to cause the lamplighters to cease lighting the streets of the city at once, until some provision can be made by which such lighting can be legally resumed. His brother councilors agreed to the proposition, and now Gallipolis is in darkness. In the meantime the city owes the Gallipolis Gas Company some hundreds of dollars for the lighting service previously rendered, and it is barely possible the law-abiding citizens of the committee may not be inclined to settle the back bills. As we understand it, the Gallipolis Gas Company has never been complained of by the residents as to the manner in which its lighting service was rendered; in fact, the service was thoroughly satisfactory in every respect. Furthermore, since the company was organized there never has been a year in which the moneys for public lighting were covered into the public treasury in advance of the making of the lighting contracts. Perhaps it would have been as well if the citizens committee had been content to leave well enough alone, for an unlighted city is not a pleasant place to look upon.

Cheaper Gas for Plainfield, N. J.—The Plainfield Gas Light Company announces that the following schedule of selling rates went into operation on date of July 1st:

A consumption under	500 cubic feet per month....	$2.50 per M.
" over	500 and under 5,000 cu. ft. .	2.25 "
" over	5,000 cu. ft., per month.....	2.00 "

The discounts apply only on such statements as are settled within ten days from date of presentation. The company's business is improving, and the action just taken will quite likely furnish a further increase in the treasurer's responsibilities—and receipts.

They do not Fancy the Light.—The contract held by the Washington Automatic Gas Light Company for the public lighting of Salisbury, Md., expired on July 15th, and the former contractors will experience some trouble in securing a renewal of the privilege. The service was unsatisfactory—in fact, who ever heard otherwise in regard to the naphtha system?—and in his despair the editor of the Salisbury *Record* exclaims: "If properly attended to the Wellington burner (the sort used by the Washington Company) may be capable of furnishing a very fair light; but it is not yet so perfect that it will attend to itself and wash the glasses at the same time." Perhaps Salisbury might do well to organize a gas company.

Foreclosing the Mortgage on the Peoples Gas Company, Albany, N. Y.—According to the Albany *Journal*, of June 30th, only a limited attendance greeted Mr. Hugh Reilly at the city hall entrance when he stepped out from the County Clerk's office and announced that he would offer for sale the entire plant, including buildings, mains, etc., of the Peoples Gas Company. Mr. Reilly was the referee in the suit, brought by Messrs. A. P. Palmer, and A. J. Parker, Jr., as trustees for the bondholders, against the company to foreclose the mortgage given to secure the issue of $350,000 in bonds. Mr. A. M. Brady bid $50,000; there being no other offer the property was knocked down to him. This completes the transfer of the gas supply of Albany into the hands of the Municipal Gas Light Company.

They will not be Questioned.—Judge Allison has decided that, under the circumstances, Mr. Francis H. Jackson, as President of the Westmoreland Coal Company, could not be required under the law to answer (in the Gas Trust, Phila., Pa., equity suit) a question relating to the freight charges paid by his company to the railroad company. In view of similar decisions rendered on kindred matters in other States we fail to see how the Trust's lawyers could expect any other action. The law on that point is explicit enough.

A Good Machine Speaks for Itself.—Mr. Forstall, the champion exponent in the States of dollar gas, is so well pleased with the working of the No. 6 Root's exhauster placed last fall in the works of the Chicago Gas Light and Coke company, that he has contracted with the Connersville firm for the erection of a duplicate instrument at the other station of old Chicago plant. Mr. Bush, of the Northern Gas Light Company, New York city, is delighted with the operation of the No. 2½ Root exhauster and engine recently put up at that plant. We are glad to say that Mr. Root's physical condition continues to improve. He has shown wonderful vitality and recuperative power, and appears to have plucked the flower of safety from out of the nettle danger.

The Southwark Foundry to Furnish Equipment for the East River Bridge.—Proposals for supplying the new cable driving plant for the East River Bridge railroad were opened by President Howell, on date of July 2d. Wm. Wright, of Newburgh, N. Y., received the award for the driving engines, his bid for same being $14,910. The Southwark Foundry and Machine Company, of Philadelphia, Pa., received the contract for furnishing the cable drums, sheave pulleys, etc., the stated price being $17,836.25. Three other firms competed for the work secured by the Southwark folks—the Phœnix Iron Company, of Trenton, N. J.; Poole & Hunt, of Baltimore, Md.; and the Dickson Manufacturing Company, of Scranton, Pennsylvania.

Annual Report of the Jamaica Plain (Mass.) Gas Light Company.—We are indebted to President Jno. C. Pratt for a copy of the Thirty-first Annual Report of the operations of the Jamaica Plain Gas Light Company. The details cover working operations for the year ended March 31st, 1886. The gross value of the business of the twelvemonth is set down at $55,723.99, of which sum $50,952.66 is credited to receipts for gas; $3,424.52 to coke; $517.80 to tar; and $829.01 to miscellaneous account. The total expenditure is shown to have been $37,801.68. The principal items are as follows: Coal, $14,618.04; labor account at works, $5,818.50 salaries, $4,600; taxes, State and city, $3,802.61; street work and repairs, $2,235.98; castings, tools,

etc., $1,470.01; extension of mains, $826.09; new steel boiler, $819; and the balance to diversified minor accounts. The net profit for year is shown to be $17,922.31; and out of that sum two semi-annual dividends of 4 per cent. each were paid. These represented a total of $16,000. From the balance the sum of $141, representing "wortlless gas accounts of two years' standing" (a pretty good showing in that respect), was charged off. These deductions left a balance of $1,780.40 to go to surplus account, which account now stands at $36,685.30. The report then goes on to say, "The foregoing statement shows the net earnings of the company to have been only $59.33 less than the previous year, notwithstanding the reduction made in the price of gas, and the fact that extraordinary expenses, amounting to $1,300, were incurred for a boiler, and other items, all of which have been charged to and appear in the statement of general expenses. These facts furnish additional proof in favor of the wisdom of the policy pursued by the directors in the past few years in the reductions made from time to time in the price charged for gas." The appendix to the report contains the following interesting figures: Coal carbonized, 2,795 tons; average yield of gas per pound of coal, 4.74 cu. ft.; average candle power of gas supplied, 17.90; coke sold, 1,575 chaldrons, or 53 per cent. of the quantity made; meters in duty, 884; street lights maintained, 558; benches of retorts in work—two benches of sixes during 241 days, and three benches of sixes during 124 days; length of street mains, 21 miles, 120 feet; officers and employees—three in first class, and ten in second. The company is capitalized in the sum of $200,000, divided into 2,000 shares of the par value of $100 each. there are 135 shareholders, of which 125 reside in the State of Massachusetts, and between them they hold 1919 shares of stock—thus proving beyond cavil that the Jamaica Plain Company is essentially a home controlled organization. The annual statement is not confined to the hands of the shareholders, but is also distributed amongst the patrons of the company. Mr. Pratt and his directors are not afraid to let daylight in upon their workings, and one result of the practice has been to convince the consumers that only a fair commercial profit is asked for and received by those who control the supply of gas light in their city.

A New Gas Company for Schenectady, N. Y.—On date of Monday, June 28th, the Peoples Gas Company, of Schenectady, filed articles of incorporation in the office of the Secretary of State. The capital stock of new company is placed at $40,000, divided into 1,000 shares of a par value of $40 each. The life of the corporation is fixed at 50 years. The directors are Messrs. Jno., Joseph H., and Wm. Clements, J. G. L. Ackerman, Clark Witbeck, Jno. Wiederbold, and Charles Washburn.

The Old, Old Story.—The "special correspondents" of out-of-town newspapers who seek to keep their respective constituencies "posted" in all metropolitan matters, have been paying their attention to the first gas bills sent out under the reduced schedule now ruling in this city. They sing the same old bosh of a nominal reduction in charges, but an actual increase in the face of the accounts. Of our own knowledge, gained from an inspection and comparison of the bills presented to the occupants of seven separate buildings in Pine street, the statements showed an average decrease of 30.50 per cent. as against those handed the same people for the corresponding days of 1885. In this connection the Cincinnati (Ohio) *Commercial Gazette's* "Special Commissioner" telegraphs to his employers that he interviewed the redoubtable Jno. H. Sherwood, on July 5th, with the following result: "We (that is, Sherwood and his fellow stock-jobbers) won a great victory when we forced the price of gas down to $1.25. Now we have to fight another fight, and oblige the gas companies to render honest bills. Nothing is easier than to make consumers use large quantities of gas. I am informed that the companies are running at 3½ inches pressure, which is a veritable cyclone. Thin gas and big air(!) pressure will force the gas out of the burners in spite of governors and care. There is something radically wrong in the way of charging for gas. It is much as if I should give you the contract for furnishing so much cloth, and you had the power to make me take as much as you wanted to give me and of the quality you wished. There is a curious thing about the measurements of the city gas examiner. You will notice now that all his observations are taken between the hours of 11 A.M. and 5 P. M., the hours when the pressure is at a minimum. Why don't he take the measure (*sic*) at 8 or 9 o'clock P.M., when all the theaters are going, and the lights all over the city are in full blast? What is easier than to drop the pressure to the lowest notch during the day, while the examiner is at work, and send it up in the hundreds at night?" Comment is useless, for the great and only Sherwood always exhibits the happy faculty of showing his long ears. The ears and the bray are ever with him.

A Pretty Good Showing.—The chief engineer of the Troy (N. Y.) water works, Mr. P. H. Baermann, C. E., recommended some time ago that the Jarvis system of boiler setting be substituted for that formerly employed on the works. Mr. Baermann's report on the practical operation of the new system shows an astonishing economy over the old style; but as he furnishes the figures in the baldest way, we take it for granted that his findings are accurate and reliable. He says: "From the test made February 9th 1885, on our first three boilers set with the Jarvis setting, it was estimated that a large saving in the cost of coal would result, having a money value (according to the estimate) of $4,524.88 upon the quantity pumped in 1884. The actual saving was as follows: 1,630 million gallons at $7.36—the average price per million gallons previous to the introduction of the Jarvis setting—would amount to $11,997.80, while the actual cost was $7,904.43, or a saving of $4,093.37. Another feature of this year's record is the reduction in the amount of ashes, from a yearly average of 19.03 per cent., to 15.50 per cent. The average cost of coal, per million of gallons pumped, since the starting of the works, is appended: 1881, $8.22; 1882, $7.84; 1883, $7.51; 1884, $6.83; 1885 (boilers set with Jarvis furnace), $4.82. The results indicate the correctness of the conclusions of the Board in regard to the introduction of the Jarvis setting, and justify the statement that the entire cost of resetting the six boilers will be paid for in a short time from the money saved in fuel charges." Cost of raising one million gallons of water one foot high, as shown by the records of the Troy company, during the past five years—1881, 0.0658; 1882, 0.0697; 1883, 0.0616; 1884, 0.0555; 1885. 0.0544.

What Cincinnati (Ohio) Pays for Her Street Gas Lamps.—Putting it in round numbers the gas lamps maintained by the City of Cincinnati cost an annual sum of $220,000. At least so says the Cincinnati *Telegram*, whose reputation for veracity is none of the best.

Something from Richmond, Va.—According to the Superintendent's (Jno. H. Knowles) report, the quantity of gas used by consumers in the city of Richmond, Va., during the 12 months ended December 1st, 1885, aggregated 138,579,368 cubic feet. The quantity taken up by the public buildings, and in street lighting, aggregated 28,820,318 cubic feet. The actual cash receipts for gas and coke were $180,778.63, while the total expenditures were $128,685.24, showing an excess of receipts over expeditures of $52,093.39. The maximum production in any twenty-four hours occurred on date of December 12, when the station meter recorded the passage of 726,000 cubic feet. The maximum consumption was attained on December 14, when 795,845 cubic feet were consumed. At date of previous annual report the length of street conduits was placed at 52 miles, 5,107 feet, and during 1885 that length was increased to a trifle over 56 miles. A Foulis automatic governor was put on the 20-inch main leading to upper portion of city. At the lower works four benches of sixes and six benches of fives were refitted with larger retorts and connections; and the covers to purifying boxes were also renewed. Mr. Knowles strongly advises the erection of another telescopic holder, and suggests that the same be calculated to a storage capacity of 750,000 cubic feet. When the old Richmond plant was equipped by Mr. Chas. Campbell, in 1854, it was rated equal to a maximum delivery of 300,000 cubic feet. Since that time the chief city of the State known as the Mother of Presidents has been through many a thrilling condition, brought on by the horrors of civil war, but the original Campbell gas enterprise has outlived it all. Not only has it lived, but, thanks to the zeal and watchfulness of those who managed it, it has thrived and prospered in every way. It should be be borne in mind that the gas used in the public buildings and in the street lamps of Richmond is supplied without charge to the municipality; and it does not seem fair that the policy should be followed. Even if the Richmond plant is owned and operated by the municipality, its controllers ought not to unduly tax those who, as private consumers, enable it to exist. We hope soon to chronicle the fact that the free system will be done away with, to the end that fair play towards all may be the rule. A comparison of total sendout, as between 1884 and 1885, shows an increase of 15,173,700 cubic feet in favor of 1885. Mr. Knowles has every reason to feel gratified at the success which has attended his administration of the practical business details of supplying the citizens of Richmond with good gas light.

What Judge Allison Said.—Elsewhere in our current item columns we make reference to a decision of Judge Allison, of Philadelphia, in regard to certain questions which the Gas Trust, in an equity suit, sought to oblige the President of the Westmoreland Coal Company to answer. Since writing that we have read the Judge's decision, and quote the following therefrom: "* * * It would be unfair to the Coal Company that their business transactions with the railroad company should be spread before the public and made known to their rivals in business or to the rivals of the railroad company. It is a trade secret which the parties may justly decline to make known, particularly when the answer would in no way connect the defendants with the transaction. Mere experiments which are purely voyages of discovery, entered upon in the hope that something will turn up, are not allowed, especially when the effort is to drag into a legal controversy affairs which have nothing to do with the subject matter in dispute between the parties to a suit. A different rule would expose every merchant, mechanic or tradesman to an oppressive as well as injurious inquisition into his private affairs, which would be intolerable, and which the law does not sanction. For the reasons stated the witness ought not to be required to answer the question."

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

Editor—JOS. R. THOMAS, C.E
Manager—C. E. SANDERSON.

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FRIDAY, JULY 16, 1886.

New Condensers for the Nassau Gas Works.

Messrs. Davis & Farnum, of Waltham, Mass., have just completed the erection of three friction condensers at the works of the Nassau Gas Light Company, of Brooklyn, N. Y. The dimensions of each are as follows: 10 feet long × 2 feet 6 inches wide at base, carrying one row of corrugated pipe, of ten stands, 27 feet high, 21 inches wide, by 3 inches deep. This secures a condensing surface of 12,000 square feet in each vessel. The Nassau plant now operates nine condensers of this pattern. In a note to us on the subject, Col. Fred. S. Benson, Engineer to the company, says: "The first condensers of this sort were put up in the works in 1882. Their work was so satisfactory that we have added, from year to year, and in accordance with our necessities, additional ones of the same design. Since the erection of the first, up to the present date (July 9th), no necessity has arisen for either cleaning or repairs. Mr. F. J. Davis superintended the erection of these; and, it is needless to say, gave us a complete and satisfactory job in every particular."

Death of Mr. Wm. P. Libby.

In the early part of the present month, Mr. Wm. P. Libby succumbed to the grim reaper. His name and fame are well known to those who are engaged in the gas business in this section of the country. Deceased was born in New Hampshire, in 1816, and became a resident of Brooklyn, in 1846. Shortly after his arrival he engaged in the drug business, forming, we believe, a firm having the title of Graefenburg & Co., with headquarters in New York city. In 1860 he became President of the Citizens Gas Light Company, of Brooklyn, which office he vacated in 1878. Deceased was somewhat interested in Brooklyn politics, and served for quite a lengthy period on the Board of Education in that city. The funeral services over deceased took place, on July 6th, at his former home, No. 48 First Place, Brooklyn, N. Y.

The Market for Gas Securities.

Quotations for city gas shares have been well maintained during the fortnight, Consolidated having shown exceptional strength. At time of writing (1 P.M., July 14th) the last recorded transaction was registered as having taken place at 83. So far we have failed to receive a copy of Attorney-General O'Brien's decision in the matter of the annulment proceedings, but all agree that the decision is likely to sustain the validity of the consolidation. The "Standard" Company managers have not kept their promises, made just after the adjournment of the Legislature; and it is just possible that the apparent profit in supplying gas in New York city at the present rates is hardly attractive enough to secure a free offering of capital for investment in opposition schemes. Mutual gas is steady and strong at last quotations; while Equitable is not much in demand.

Brooklyn shares are quiet. It may be said, however, that Metropolitan is inquired after pretty often, and we doubt if intending purchasers could secure any considerable lot of the stock at asking price quoted.

Consolidated, Baltimore, is somewhat higher. The annual meeting of the Company will be held, on July 19th, at the office, No. 19 South street. Transfer books closed on July 5th, to be reopened on July 19th.

The New Bedford (Mass.) Gas Light Company has declared a dividend of $4 per share, payable on demand. The Brookline (Mass.) Gas Light Company declared a dividend of 3 per cent., payable, to stockholders of record on June 25th, since July 15th.

Some activity is noted in the shares of the Havana (Cuba) Gas Light Company. Transfers have taken place at the figure of $19½ per share, Spanish gold—equal to about $18 in our currency. Havana bonds have been up to 104½. These figures would seem to indicate that the Company's business is improving; and it might be possible that those of a speculative turn of mind could make a turn by purchasing some of the common stock.

Canada gas shares are making their appearance in the New York market, but only in limited quantity.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks,

16 WALL ST., NEW YORK CITY.

JULY 16.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid	Asked
Consolidated	$35,430,000	100	82½	83
Central	440,000	50	—	—
" Scrip	220,000	—	47	57
Equitable	2,000,000	100	120	123
" New Stock			150	155
" Bonds	1,000,000	—	113	115
Harlem, Bonds	170,000	—	—	—
Metropolitan, Bonds	658,000	—	113	—
Mutual	3,500,000	100	111	113
" Bonds	1,500,000	1000	104	107
Municipal, Bonds	750,000		—	—
Northern	125,000	50	—	—
" Scrip	108,000			
Yonkers		50	51	55
Richmond Co., S. I.	300,000	50	60	—
" Bonds	40,000	—	—	—
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	111	113
Citizens	1,200,000	20	70	72
" S. F. Bonds	320,000	1000	106	110
Fulton Municipal	3,000,000	100	152	154
" Bonds	300,000		104	108
Peoples	1,000,000	10	68	70
" Bonds	290,000	—	106	107
" "	250,000	—	103	—
Metropolitan	1,000,000	100	88	90
Nassau	1,000,000	25	115	118
" Ctfs	700,000	1000	101	102
Williamsburgh	1,000,000	50	134	136
" Bonds	1,000,000	—	112	114
Out of Town Gas Companies.				
Buffalo Mutual, N. Y.	750,000	100	85	90
" Bonds	200,000	1000	95	100
Citizens, Newark	918,000	50	130	140
" " Bonds	124,000	—	105	110
Chicago Gas Co., Ills	5,000,0000	25	128	135
Peoples G. L. & C. Co., Chicago, Ills	3,000,000		8	12
Cincinnati G. & C. Co.			184	187
Consolidated, Balt.	6,000,000	100	51¾	52
" Bonds	3,600,000		107	107½
Chesapeake, Balt	1,500,000	100	73	75
"	1,000,000		100	102
Central, S. F., Cal.			70	72
Capital, Sacramento, Cal.			54	56
Hartford, Conn	750,000	25	140	142
Jersey City	750,000	20	155	160
Laclede, St. Louis, Mo.	1,600,000	100	90	95
Louisville, Ky	1,500,000	50	115	120
Montreal, Canada	2,000,000	100	181	182½
New Haven, Conn		25	190	195
Oakland, Cal			35	35½
Peoples, Jersey City		—	25	30
" " Bonds			—	—
Paterson, N. J		25	90	—
Rochester, N. Y		50	75	80
St. Louis, Missouri	600,000	50	—	500
San Francisco Gas Co. San Francisco, Cal.	10,000,000	100	59	60
Memphis (Tenn.) Gas	750,000	100	80	82
" Bonds	240,000	100	103	—
Washington, D. C	2,000,000	20	207	—
Wilmington, Del		50	205	215
Havana (Cuba) Gas Co.	3,000,000	100	18	20
" Bonds	550,000		102	—

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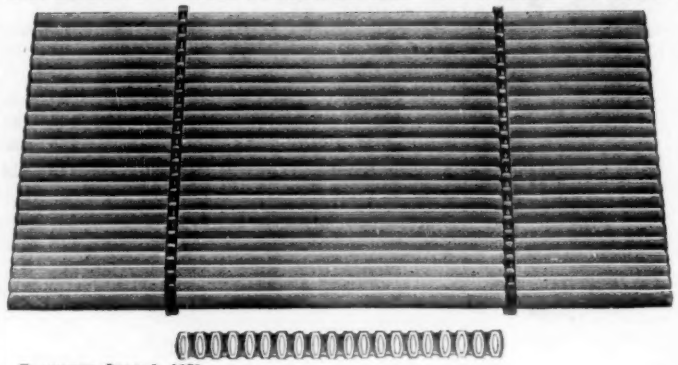

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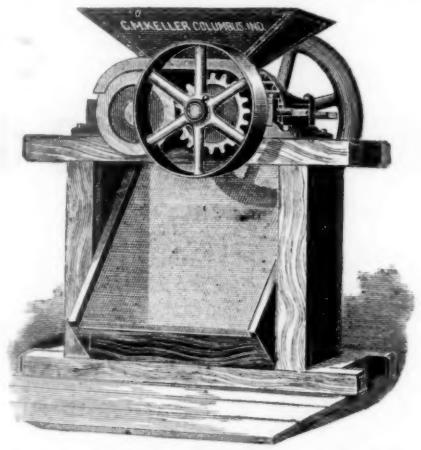

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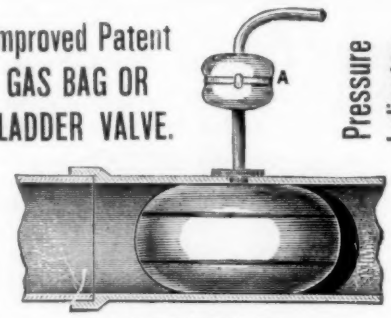

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It is a Silent and Ever Faithful Servant!

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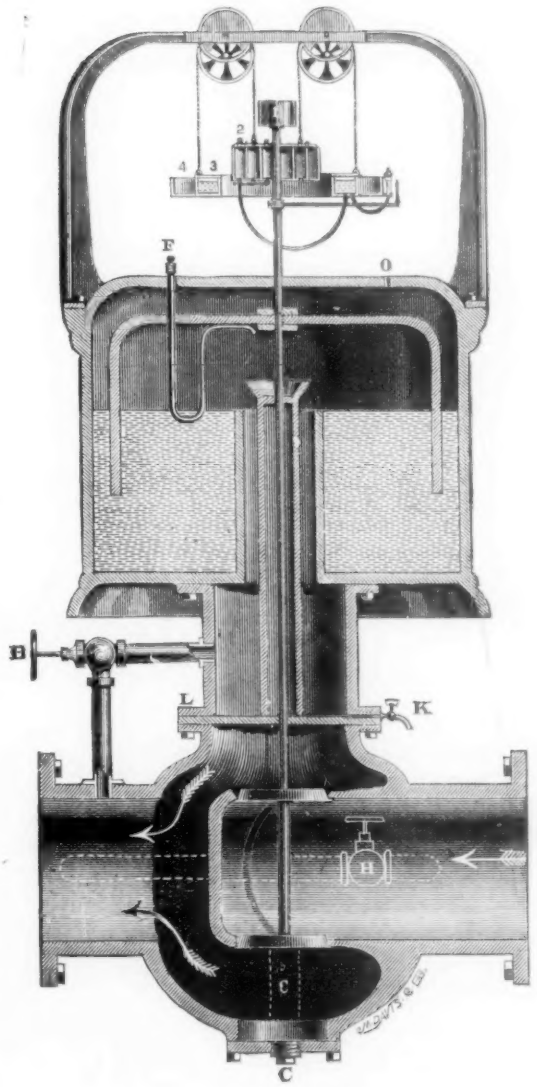

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C. D. FLANIGEN, Agent.

Plainfield, N. J.

PLAINFIELD GAS LT. CO., PLAINFIELD, N. J., March 8, 1886.

Messrs. CONNELLY & CO., LTD., 177 Broadway, N. Y.:

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H. G. RUNKLE, Treas.

Evanston, Ill.

NORTHWESTERN GAS LT. AND COKE CO., EVANSTON, ILL., April 6, 1886.

Messrs. CONNELLY & CO., LTD., 177 Broadway, N. Y.:

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Pottstown, Pa.

POTTSTOWN GAS LT. CO., POTTSTOWN, PA., March 9, 1886.

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Yours truly,

L. P. EVANS, Treas.

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These Generators are designed to manufacture Siemens Gas (30% combustible), Water Gas (carbonic oxide and hydrogen, non-illuminating), or Carburetted Hydrogen (illuminating gas of any candle power desired),

From Any Combustible Material, More than Twice as Fast, and at Less than Half the Cost,

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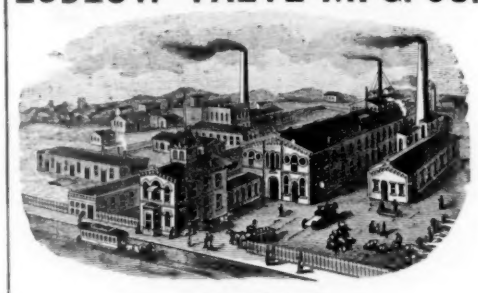

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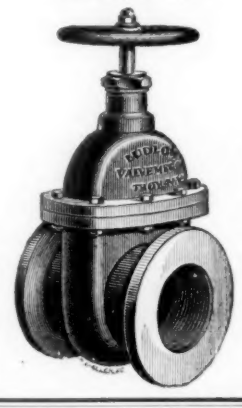

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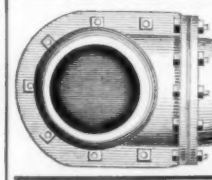

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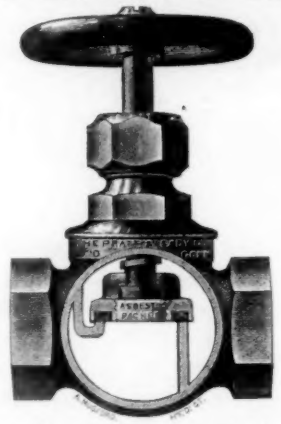

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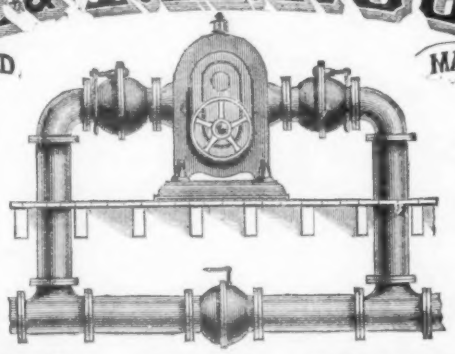

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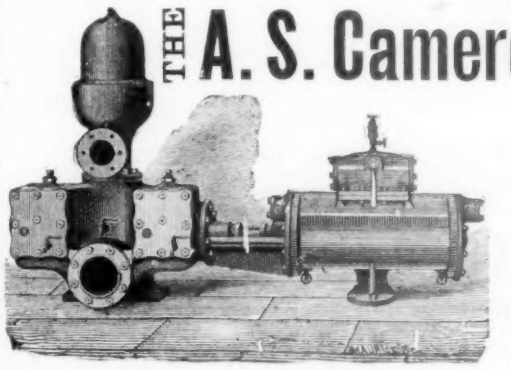

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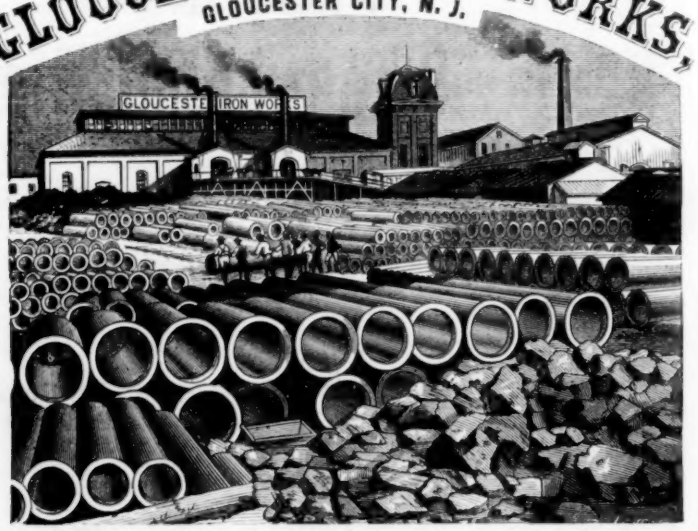

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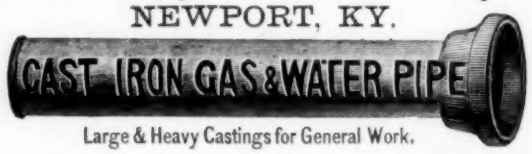

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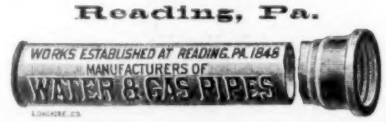

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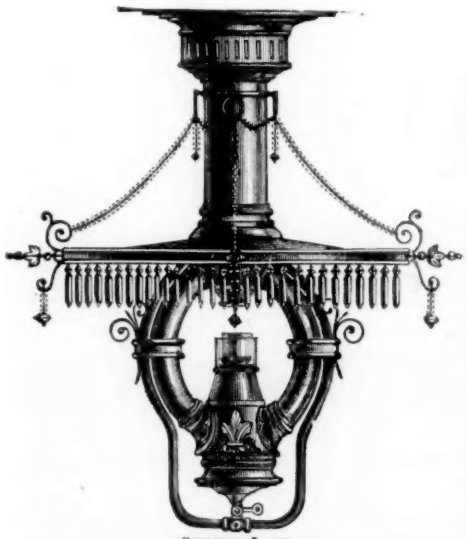

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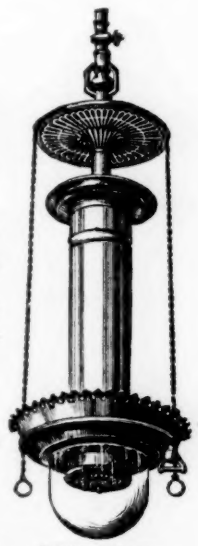

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NO OTHER APPARATUS REMOVES ALL THE AMMONIA FROM THE GAS.

Its dimensions admit of placing it under cover without the great expense incurred in a high building to protect Tower Scrubbers from changes of temperature; thus the "Standard" Washer-Scrubber costs much less than other systems.

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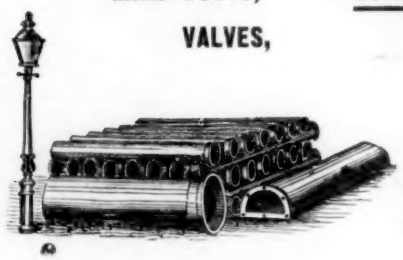

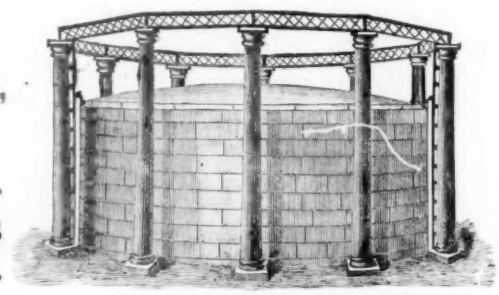

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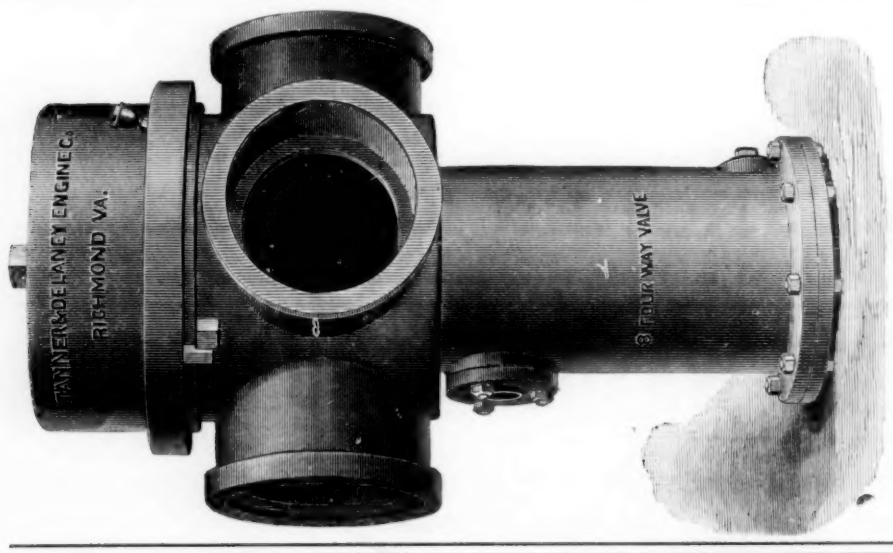

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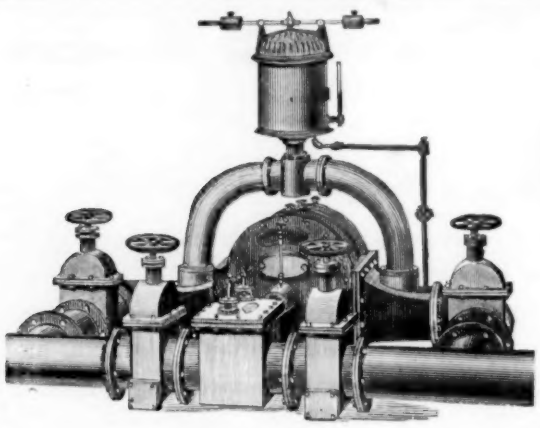

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" "	"	220,000	"
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Canton, "	"	60,000	"
Akron, "	"	80,000	"
Xenia, "	"	10,000	"
Adrian, Mich	"	65,000	"
Ypsilanti, Mich	"	25,000	"
Muskegon, "	"	70,000	"
South Bend, Ind	"	70,000	"
Anderson, "	"	20,000	"
Plainfield, "	"	10,000	"
Springfield, Illinois	"	100,000	"
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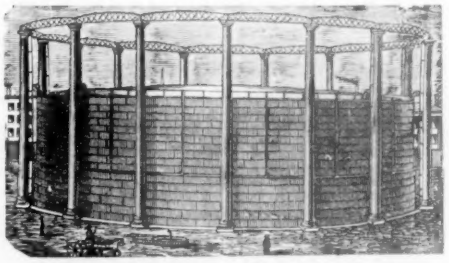

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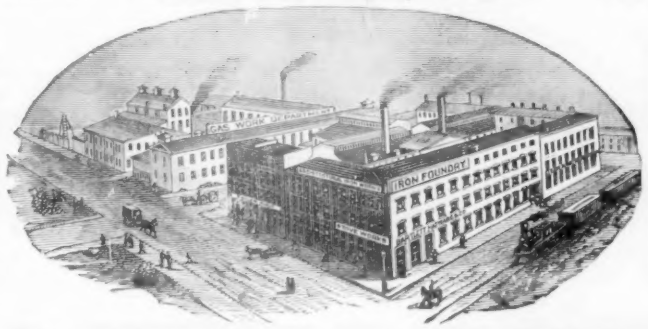

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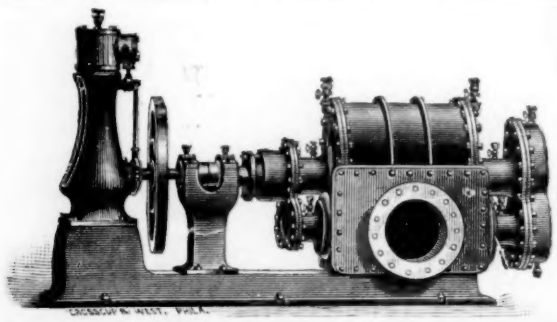

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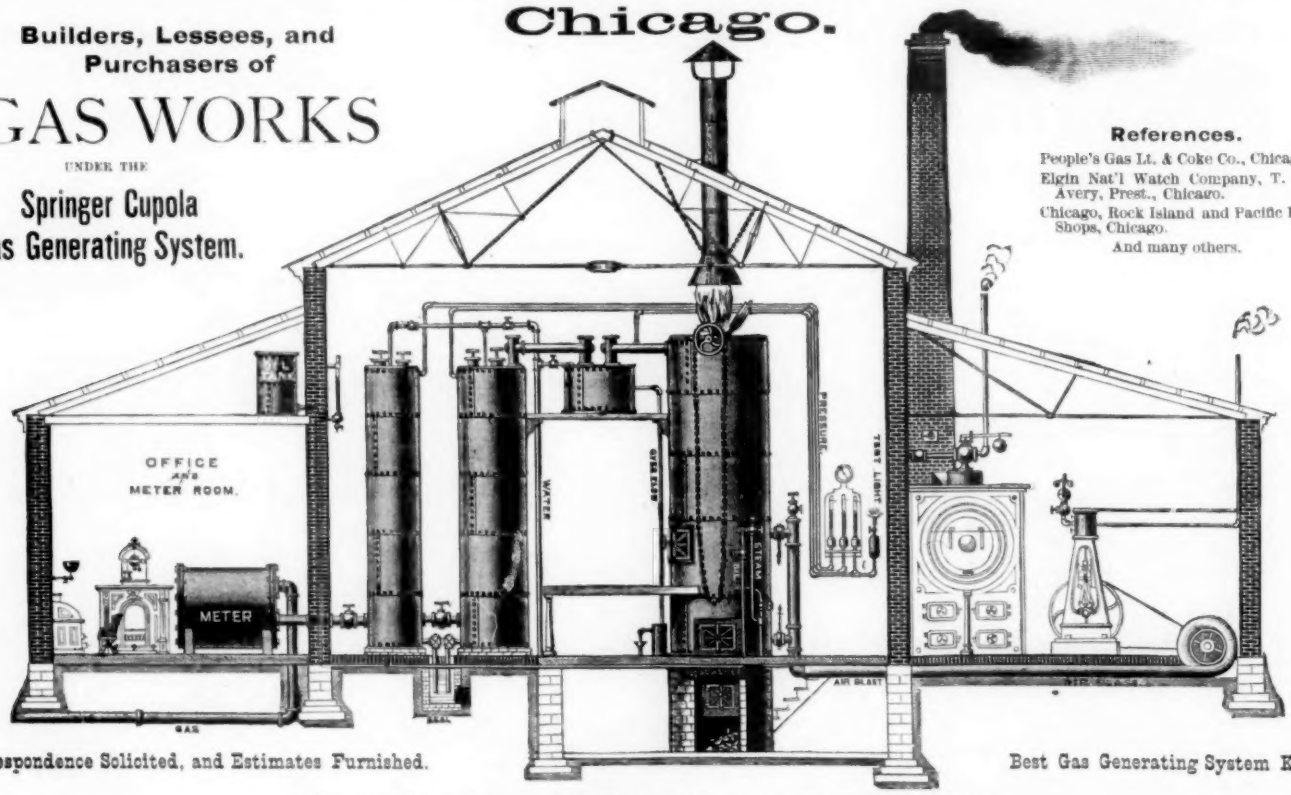

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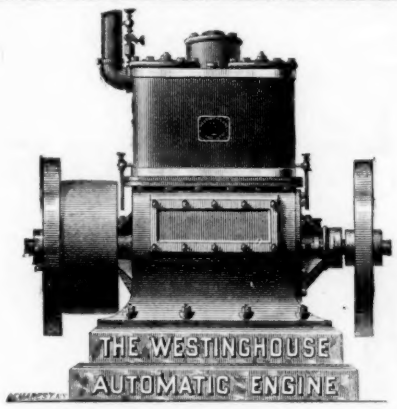

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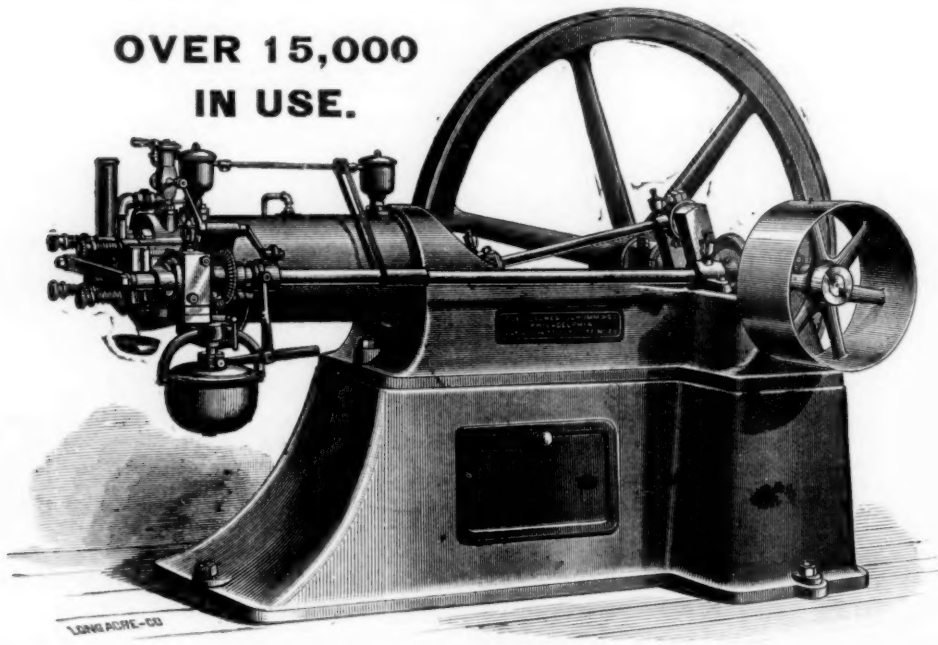

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